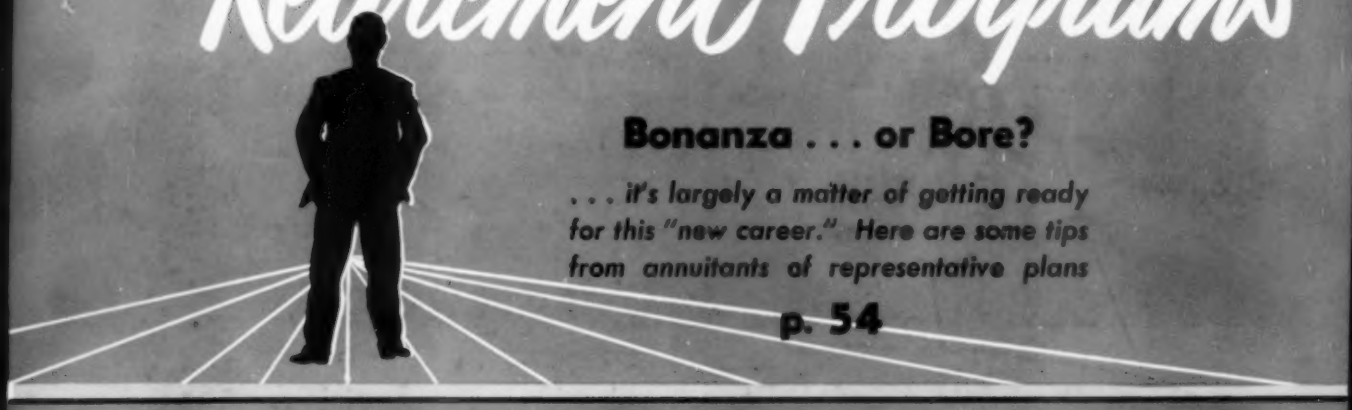
the OIL AND GAS JOURNAL

FEBRUARY 3, 1958

FIVE-COMPANY STUDY OF

Retirement Programs



Bonanza . . . or Bore?

. . . it's largely a matter of getting ready for this "new career." Here are some tips from annuitants of representative plans

p. 54

CANADIAN OIL:

How will it find a market? p. 49

Looking at Venezuela for Opportunities?

This study may answer some of your questions. p. 76

How Pan American drilled

TEXAS' DEEPEST WELL

p. 80

HOW MUCH BETTER?

How much better is a job well done? How do you weigh the worth of a merely adequate cementing job against the value of the best available? For more than 34 years, Halliburton has set but one standard for its cementing service: the best that research and experience can produce. And, like all quality commodities, its value is remembered long after its cost is forgotten.

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The OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Feb. 3, 1958

Oil came out of Venezuelan turmoil without a scratch:

Private reports from inside the strife-ridden country give this picture for the oil industry:

...Oil facilities were unhampered.

Refineries suffered only minor drop in production.

Only one incident was reported involving a well in the field.

...Public opinion still appears favorable to oil.

...Political outlook also seems good.

New rulers have promised to protect investments.

Conservative elements appear firmly in the saddle at the moment. But an increasing number of politicians are expressing plans to change oil's way of doing business in the country.

This may spell future trouble for oil. It's too early yet to tell.

Keep an eye on the political maneuvering and the Army. The Army is not behind the present junta. It may step in if too radical elements show signs of gaining ascendancy.

...Oil's future plans are still expansive.

Budgets of some older firms operating there may be trimmed this year due to general world conditions.

Newcomers still will be busy proving up their expensive concessions and long-term outlook is good for all (p. 52).

Canada has been offered partial solution to the dilemma of production outstripping its markets.

Consultant Walter Levy makes these suggestions:

...Cut wellhead prices by 10 cents a barrel.

...Reduce pipeline charges, especially to Montreal.

...Impose import duty of 10 cents a barrel.

...Push policy of Canadian markets for Canadian oil.

Levy says his plan is based on the fact that Canadian oil suffers a 25-cent per barrel disadvantage in competition with foreign oil for the Eastern Seaboard market (p. 49).

Outlook for Canadian gas export is brighter.

Prime Minister Diefenbaker has cleared the air by reversing earlier statements that the Borden Commission plans no interim report on availability of gas for export.

This is being interpreted to mean new Canadian gas will be available for export to U. S. sooner than expected.

Oil labor expects a wage raise in 1958.
But it also expects a tougher fight from management.
That's view of OCAW President Knight preceding meeting of union's big bargaining policy committee in Denver later this month. The committee will draft union's 1958 goals.
Knight admits that actual outcome of this year's union negotiations with oil will depend on economic outlook. Any sharp recession would slow upward wage movement, he says.

Knight's views are these:
Wage increases should be geared to increased production and profits.
Job security and full employment should be heritage of every man willing and able to work.
Pensions should be better with companies paying full costs. This may be big fringe-benefit goal of OCAW in 1958.
Shorter work week will be necessary sooner or later to spread work. He is worried by increasing layoffs in oil due to automation and other factors such as stepped-down output.

Knight emphasizes that over several years trend has been toward better labor-management relations in oil. But he warns that unreasonable management toughness this year will be met by a militant attitude from labor.
Union men, he says, will not tolerate drastic layoffs, frozen wages while profits gain.

Placement people in Texas oil companies and colleges warn not to be fooled by talk of surplus engineers.
They insist the shortage is not over. Their report:
...Supply of chemical and mechanical engineers still is far short of demand, at the moment is the most critical.
...Civil engineers also are still in short supply.
...Situation for petroleum engineers has eased somewhat, but demand is still good.
Their explanation why recruiters have eased up their frenzied manhunt on the college campus: Many just haven't been able to get the men they wanted. Recruiting, however, is still going on.

A new instrument heralded as greatest boon to drilling in years may be perfected within a year.
It would give the driller on the rig floor continuous check on degree of hole deviation from vertical.
Several oil companies—reportedly Humble, Atlantic, Phillips, and Schlumberger—have their research labs busy on the project. Reliable sources say a tool may be in the field within a year or possibly two.
Here's what the instrument would do for drillers:
...Eliminate the "wild" hole which suddenly shoots off at a pronounced angle between deviation surveys.
...Cut rig time and speed penetration. It would eliminate shutdowns for running deviation surveys. It also would permit heavier weight on the bit.

New company specializing in offshore drilling from floating barges soon may be formed in California.

Los Angeles sources say the new group is negotiating to take over the CUSS Group's $4-million floating drill barge and make it available for contract drilling.

In addition, the know-how and personnel for offshore exploratory drilling will be furnished.

Offshore drilling in the gulf may slide further later this year.

Rig count already has dropped to 73. It was 116 at this time last year.

One company source says number of operating rigs may fall to 50 or 55 before the year is over. That would be comparable to severe slump of 1956 when the Supreme Court curtailed drilling in the disputed area.

Drillers shooting for the lucrative business offered by deep wells face headaches in equipment and techniques.

That's the lesson learned from Pan American's 1-CS University, deepest well in Texas and world's second deepest.

How Pan American used special drill pipe, other heavy equipment and the planning needed to avoid trouble make one of best stories in 1957 drilling (p. 80).

Increased Venezuelan drilling activity is offering big opportunities for entry of more drilling firms, sales and distribution houses, and field drilling service.

If you're considering a Venezuelan venture, better get a complete rundown on the oil country there and what it costs to do business. Two experts who've just completed such a study give their findings in a series starting this week (p. 76).

Special session of California legislature to consider emergency subsidence legislation is likely.

There's a good chance Gov. Goodwin J. Knight will issue the call this week so session can run concurrently with the regular budget session.

Meanwhile, harried Long Beach city officials are rushing to completion a proposed bill. It would authorize the oil and gas supervisor to order compulsory unitization in the sinking Wilmington oil field.

Why the rush? The Navy threatens to close down its big Long Beach base unless something is done before summer to halt disastrous subsidence. The Navy base accounts for one-seventh of Long Beach income.

Crude production in California may slide below 900,000 bbl. daily before the end of February.

That's lowest production mark since 1947.

The normal decline in the state's producing wells is being

aggravated by shutting in of more than 25,000 bbl. daily of low-gravity production.

Process automation is picking up speed on the Gulf Coast.

One large refiner already has installed a closed-loop controller using an analog computer. It's the first such system to be placed on a processing unit.

A second unit is going into Texaco's big refinery at Port Arthur on a hydrogen-treating unit. Ramo-Woolridge, designer of the equipment, has made Texaco an unusual offer. Ramo-Woolridge will stand costs of installing closed-loop control system using digital analog computer and operate the unit for 6 months. Then Texaco can decide whether to pick up tab.

Gas turbines are making rapid inroads as a producer of shaft power and cheap recoverable exhaust heat in refineries and petrochemical plants.

Main reasons: Cheaper to install, operate, and maintain.

But more important, their dependability is being proved in applications requiring long periods of continuous operation (p. 88).

Some definite patterns are emerging for today's motor fuels. Researchers reporting on new survey data say:

...Vapor-pressure level is trending upward.

...Premium-grade fuels show the preponderance of high-vapor-pressure.

...The large oil companies are marketing the most high-vapor pressure fuels (p. 93).

Talk of merger for Coastal Transmission and Houston Texas Gas & Oil has taken a new turn.

Both may retain their identities by becoming subsidiaries of a third company, the Houston Corp. The third firm is headed by F. E. Stanley, who also is president of Houston Texas Gas & Oil. It has option to buy several gas-distribution systems in Florida.

Clint Murchison and Delhi-Taylor, backers of Coastal Transmission, reportedly would be represented in the parent company.

Coastal and Houston Texas Gas & Oil have permits for separate legs of a gas-transmission system from South Texas to Florida. Consolidation under one company is expected to simplify financing arrangements.

Electronic computers are becoming more popular among gas-transmission companies.

Their value was proved recently by Northern Natural Gas.

Company was in a big hurry to complete expansion plans to lay before the FPC. With the computer, Northern Natural was able to determine the best 12 options within a few days. Ordinarily it would have taken months to do same job manually.

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IN THE NEWS

General Interest:

Tariff, Lower Price Suggested to Help Canadian Oil 49
Import Problems Grow With New Requests for Quotas 51
Oil Industry Rides Out Venezuelan Revolution 52
New Study Shows How Oil Retirement Plans Are Working 54
Petrofina Expands Again, Takes Over Atlas Corp. 58
Oil Companies Are Leaders in Peacetime Atom Research 60
Texaco May Take Over Seaboard in Stock Exchange Deal 62
Gulf Fined $305,000 for Contempt in Oklahoma 64
Talkative Senator Turns Tables on Oil Men 64
Good-Faith Ruling May Bring New Push in Congress 70
San Jacinto Reorganizes, Moves Headquarters to New York 73

Exploration:

Deep-Water Gulf Wildcat May Be New Discovery 53
U. S. Opens Part of Kenai Moose Range to Leasing 58
Paraguay Attracts New Attention From Oil Explorers 71
West Germany's Deepest Well to Be Abandoned 73
Texaco Is Negotiating for New Acreage in Peru 73
Arizona: The State to Watch in 1958 141
Careful Groundwork Pays Off in Cooke, Grayson Counties 142

Processing:

Sun, Fluor Offer Waste-Treating Process 62
Processing Briefs 63
Refinery Crude Capacity Will Top 9 Million Barrels 67
Petrofina Will Open African Topping Plant This Month 73
Pilot Plant on Stream at Venezuelan Petrochem Complex 74
Socony and Two Greek Citizens Lease Athens Refinery 74

Pipelining:

New Mexico Producers Want Wells Connected to Pipelines 50
More Alberta Gas Signed for Export to California 57
Cherokee to Expand Oklahoma-Wood River Pipeline System 60
Pipeline Briefs 67
Gas Bill Opponents Gear for Battle on House Floor 68
FPC Won't Require Memphis Decision Compliance for Now 70

Drilling and Production:

Alberta Demand Rises Despite Cuts by U. S. Refiners 59
Air and Gas Drilling Data May Be Centralized by AAODC 66
Union Fails in Bid to Organize Permian Basin Drill Crews 66
Giant Fork Lift Helps Assemble Alco Power Units 68
World Output Drops Again; Venezuela, Middle East Down 72

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TECHNOLOGY—OPERATION

Drilling-Production

Looking at Venezuela for Opportunities? . . . 76

By H. L. Franklin and W. D. Miller

With the large increase in Venezuelan drilling activity and much more to come, there are good opportunities for additional drilling firms and drilling suppliers. Here is a look at the current oil activity in this important area.

How Pan American Drilled Texas' Deepest Well . . . 80

By Ed McGhee

The 1-CS University well was bottomed at 21,687 ft. while looking for the Devonian in West Texas. Parker Drilling Co.'s Rig 26 drilled the well and had singular success in staying out of trouble.

Determining Net Pay in Pembina Field . . . 97

By T. P. Cutmore

The gamma ray-MicroLog combination determines net pay accurately and can replace core-analysis data. With this technique considerable money was saved on field wells by eliminating unnecessary coring.

Elements of Field Processing—47: Calculation of Enthalphy—1 . . . 101

By Dr. John M. Campbell

In making energy calculations it is important to understand the term enthalpy, how it is calculated, and how to use the many correlations of enthalpy data which have been developed. Part 1 of a continuing discussion on this subject.

Pipelining

Muskegon Pipeline Construction Was Tough 85

By Gene Kinney

The contractors had to battle swamps, heavy timber, and walk a right-of-way tightrope through high-priced agricultural, residential, and industrial areas to build the 166-mile, 10-in. line from Griffith, Ind., to Muskegon, Mich.

Pipeline Construction Report . . . 117

Refining-Processing

Cheaper Power Generation With Gas Turbines . . . 88

By C. R. Apitz

These machines are being used in many places in the refining and petrochemical fields. Uses include drivers for pumps, compressors, and generators. The turbine may also be used as a hot-gas generator for catalyst regeneration. Here are application techniques, data on cost of operation, and predictions for these machines.

Nelson Refinery Construction Index . . . 92

Fuel Vapor Pressure Is Trending Upward . . . 93

By T. W. Legatski, O. C. Bridgeman, and E. W. Aldrich

These patterns for determining motor fuels are becoming apparent: (1) A strong upward trend in vapor pressure; (2) Preponderance of high-vapor-pressure fuels is greatest in the premium grade; and (3) Large companies are marketing the higher vapor-pressure fuels.

On The Job . . . In The Plants . . . 104

California Oil Co. is using an epoxy resin and silica compound to repair pitted and corroded pipes at its Perth Amboy refinery—Electric-resistance-welded carbon-steel tubing is now considered reliable for refinery and other types of pressure applications, thanks to immersed ultrasonic testing.

PETROdatics . . . 106

The Foreman's Page . . . 109

Refiner's Notebook . . . 111

Questions on Technology . . . 113

DEPARTMENTS

They Say	31	Foreman's Page	109	Personals	164
Calendar of Events	36	Refiner's Notebook	111	Deaths in the Industry	167
Journally Speaking	43	Questions on Technology	113	Statistical Summary	168
Editorial	45	Drilling Contractors	115	Drilling Statistics	169
Watching Washington	59	Pipeline Construction Report	117	Supply Statistics	170
International News	71	New Equipment	130	Refining Statistics	171
Elements of Field Processing	101	Trade Literature	135	Markets	172
On the Job . . . Plants	104	Equipment Men in News	137-176	Classified Advertising	173
PETROdatics	106	Exploration Highlights	141	Advertisers' Index	177

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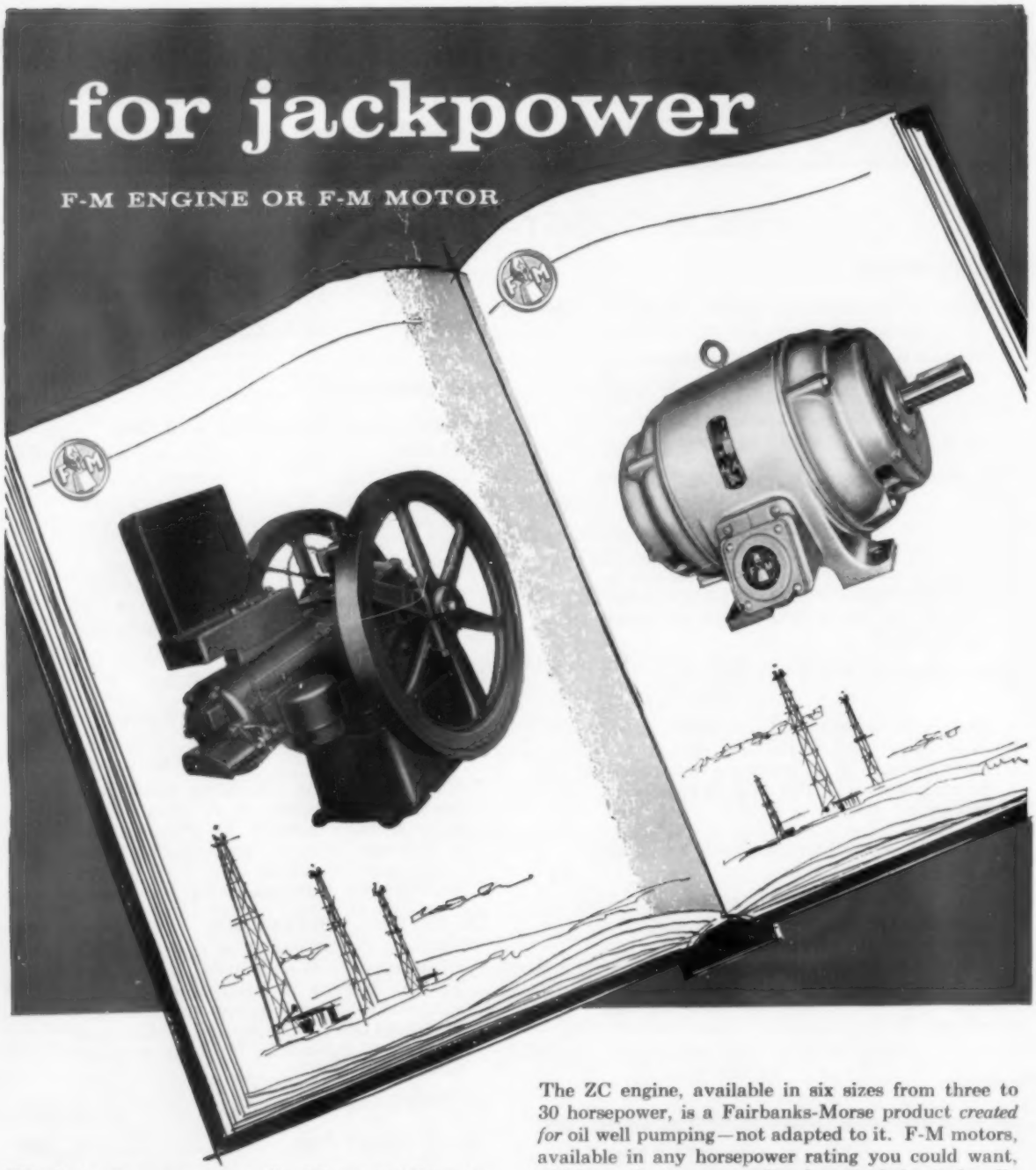

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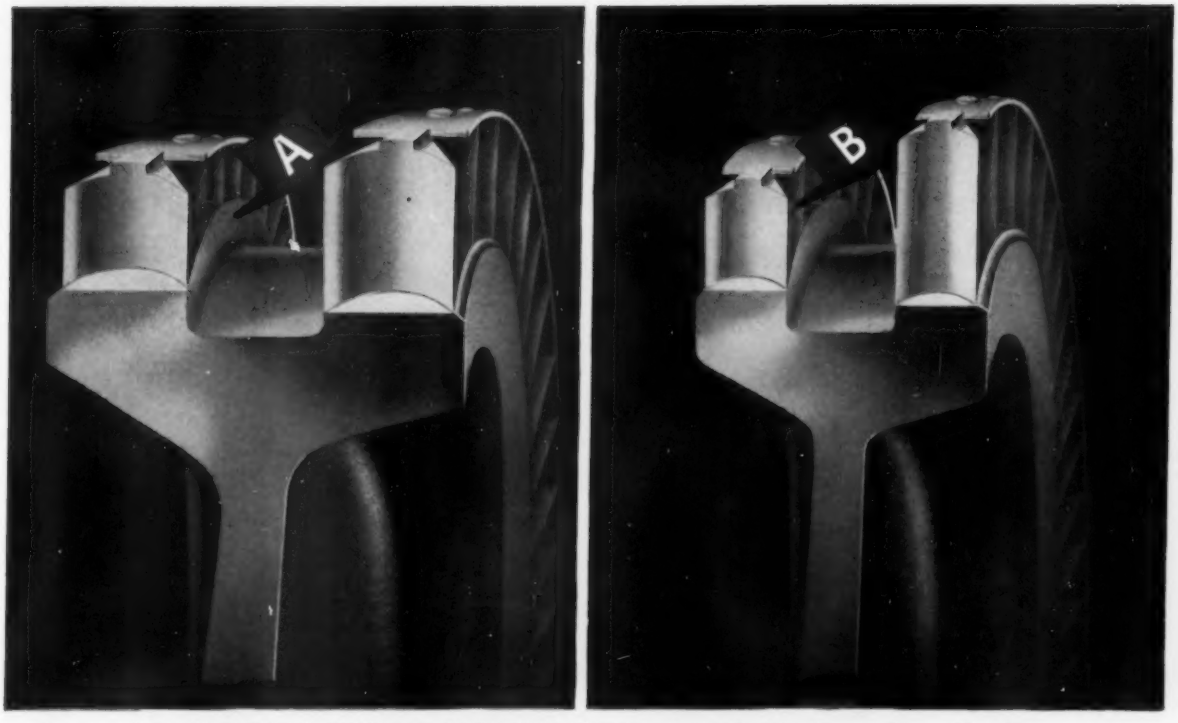

(Left, A) wide bucket "L" type wheel. (Right, B) regular type wheel for Coppus Steam Turbines

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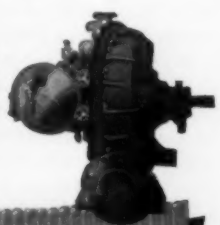

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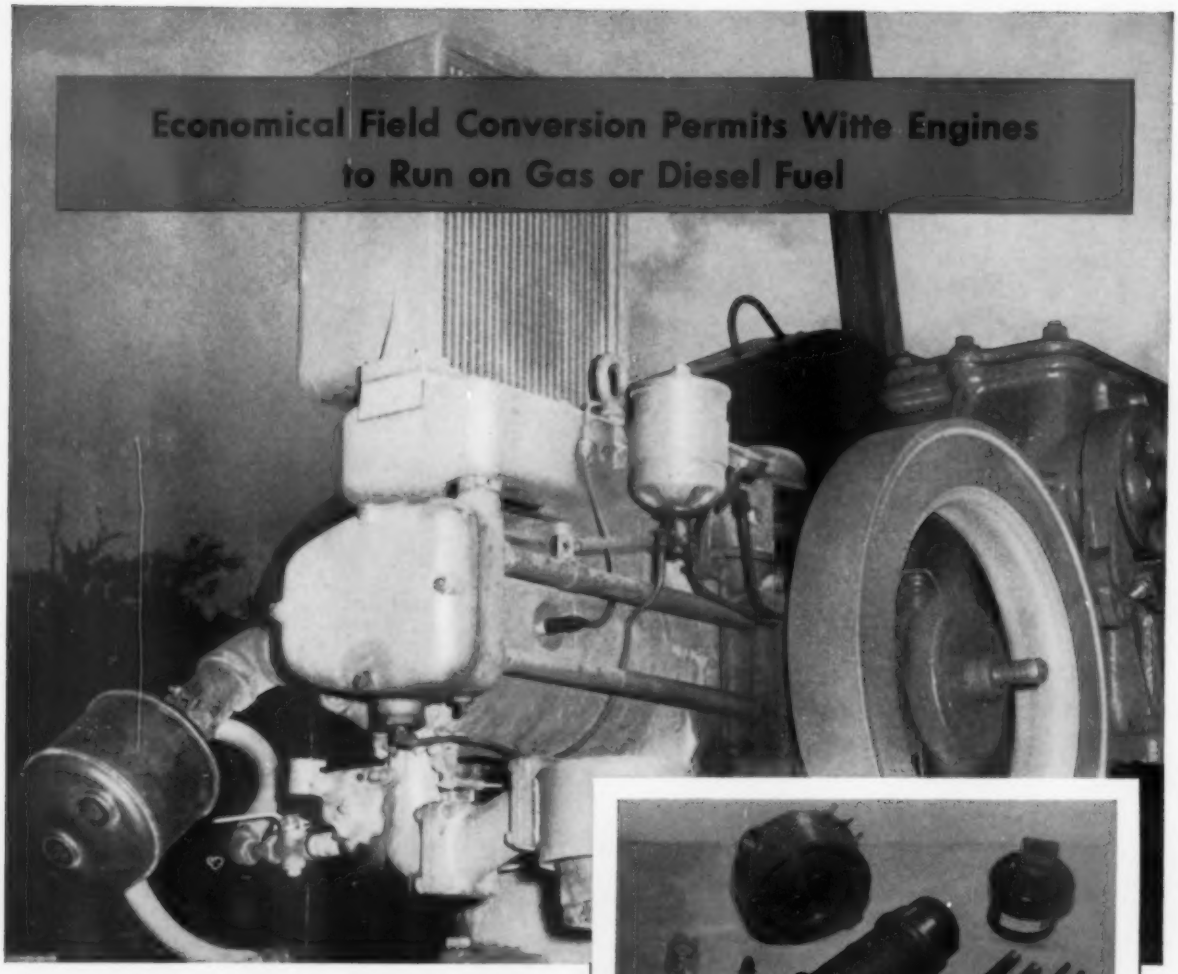

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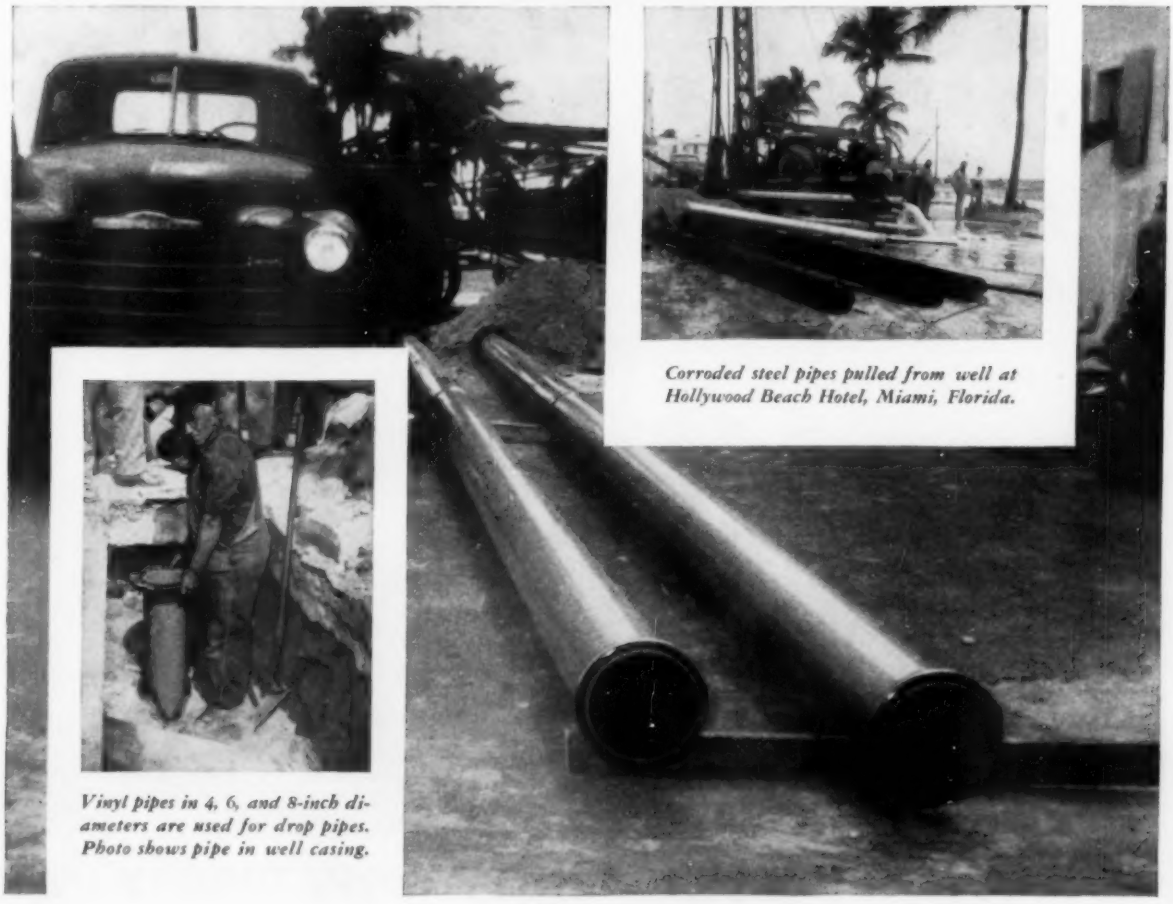

Corroded steel pipes pulled from well at Hollywood Beach Hotel, Miami, Florida.

Vinyl pipes in 4, 6, and 8-inch diameters are used for drop pipes. Photo shows pipe in well casing.

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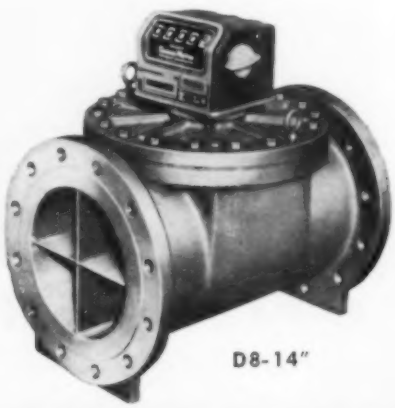
DI-6"

D4-10"



D8-14"

GRANCO REMAUTOBRATION*

- **Integral metering assembly can be *remotely calibrated.***
- **Turbine unit interchangeable *without* disturbing pipeline... no handling equipment required.**

Remote Calibration for Automation

Service at your fingertips...

installation of calibrated 12" Duo Rotor Assembly, BY ONE MAN

Revolutionize Metering Capacities up to

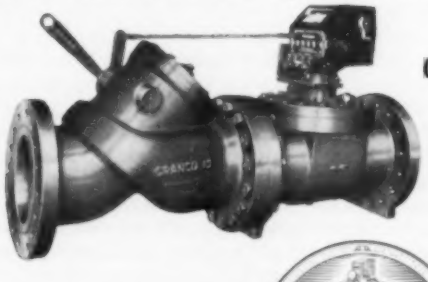
40,000 BPH!

D28-30"
Counter Below Eye-Level.

14 MODELS

CAPACITIES FROM 100 GPM to 40,000 BPH

PIPELINE SIZE... *Easy to install*



GRANCO ACCESSORIES

10" Balanced Pre-Control Valve—LARGEST AVAILABLE!
- Finger-tip opening
- Positive, soft-closing action
- Speed of closing adjustable—eliminates line shock

EXCLUSIVE, Temperature-Viscosity Compensator
- Assures complete control of volume handled
- Corrects counter reading for any change in temperature or viscosity of product

Send for full information on this latest development in the Petroleum Metering Field! Write direct to...

Granco METERS and PUMPS

Manufactured by GRANBERG CORPORATION
1308 SIXTY-SEVENTH ST. • OAKLAND 8, CALIFORNIA

Build like this...anywhere, anytime at modest cost...without delay or red-tape

Spacious column-free interiors have superior ventilation, illumination and temperature control characteristics. These are just a few of the other advantages the Butler Building System offers. Note convenient mezzanine over offices.

Many companies have found a simple way to eliminate the costly, time-consuming work required to plan and build the facilities they needed in different parts of the country to serve the rapidly expanding oil industry.

First, they standardized building design with Butler building components. Then, they turned construction over to the nationwide network of Butler Builders.

By utilizing the Butler Building System they were able to enjoy the many advantages this method of construction offers over traditional building methods. Economically mass-produced, pre-engineered Butler components eliminated routine engineering, time spent checking specifications against local building codes, costly custom-fabrication.

The Butler Builders' trained erection crews, working with precision-made, pre-punched, die-formed components were able to erect and finish building weeks—even months—sooner than traditional building methods would have permitted.

Get the full story on how the Butler Building System and the Butler Builder organization can help you solve construction program problems. Your Butler Builder is listed in the Yellow Pages of your phone book under "Buildings" or "Steel Buildings." Or write direct.

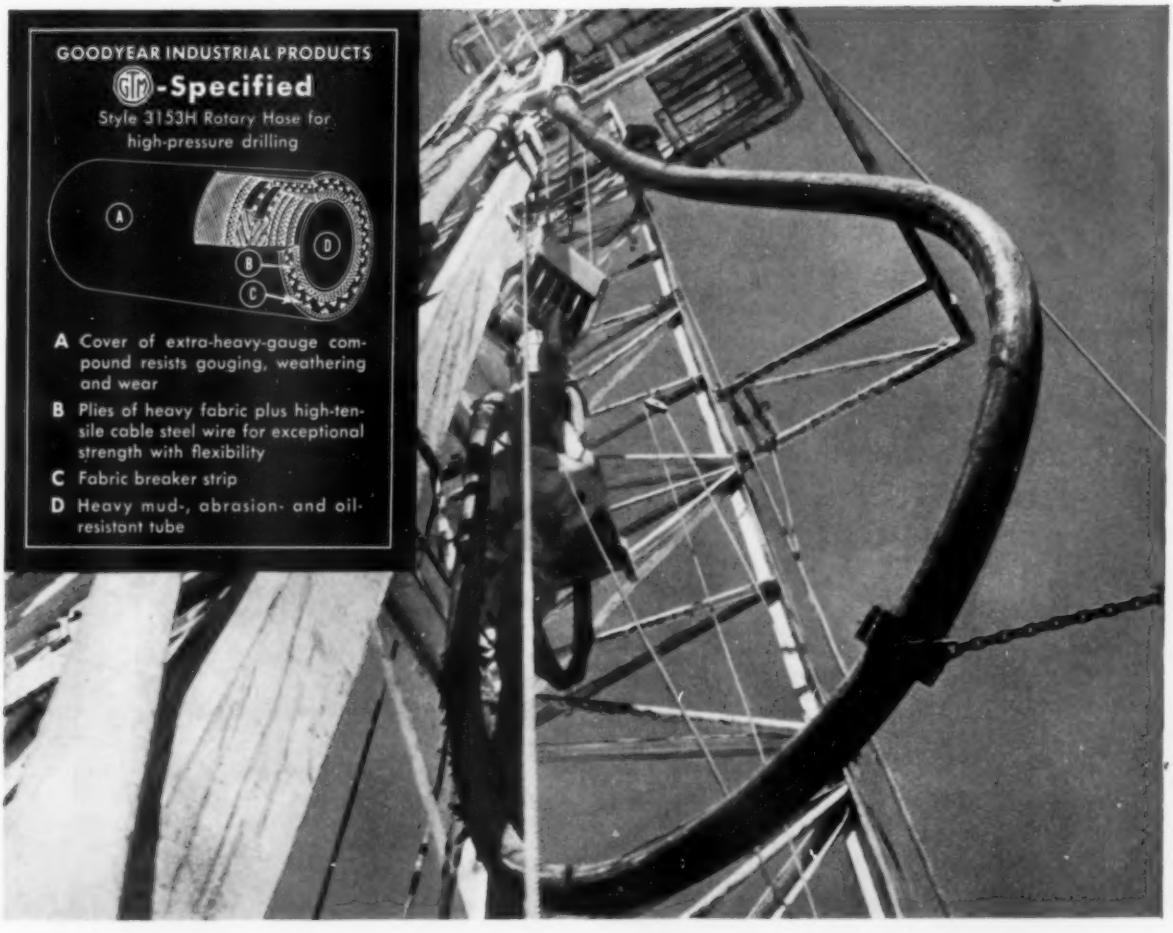
BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY

7464 East 13th Street, Kansas City 26, Missouri

Manufacturers of Buildings • Oil Equipment • Farm Equipment • Dry Cleaners Equipment • Outdoor Advertising Equipment • Custom Fabrication

Sales offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Atlanta, Ga. • Kansas City, Mo. • Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. Cleveland, Ohio • Pittsburgh, Pa. • New York City and Syracuse, N.Y. • Boston, Mass. • Washington, D. C. • Burlington, Ontario, Canada


GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
Style 3153H Rotary Hose for high-pressure drilling
A
B
C
D
A Cover of extra-heavy-gauge compound resists gouging, weathering and wear
B Plies of heavy fabric plus high-tensile cable steel wire for exceptional strength with flexibility
C Fabric breaker strip
D Heavy mud-, abrasion- and oil-resistant tube

One 200,000-foot success story leads to another!

There are no easy holes in the Permian Basin. In fact, the territory worked by this operator has such dense rock strata that drilling is torturously slow –the constant vibration so strong it rapidly flexes the life out of most rigs' hose.

That's why the G.T.M.–Goodyear Technical Man–saw the job as one for Style 3153H Rotary Drilling Hose with built-in, streamlined couplings. This hose's steel-cable-reinforced construction is factory-tested to 5,000 p.s.i. And the unique couplings provide full end-to-end flexibility–making available 5 additional feet of useful length on a 55-foot length of hose.

How well did the G.T.M.'s hose work here? *The operator used it through an amazing 41 holes–200,000 feet of the toughest drilling in Texas. He was so satisfied, he bought another Style 3153H to succeed it. And hose number two is off to a flying start!*

A Goodyear hose for your work? There's a complete line of Goodyear hoses and other industrial rubber products designed for the oil field. Just contact the G.T.M. through your Goodyear Distributor –or write Goodyear, Industrial Products Division, Akron 16, Ohio.

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

ROTARY DRILLING HOSE by

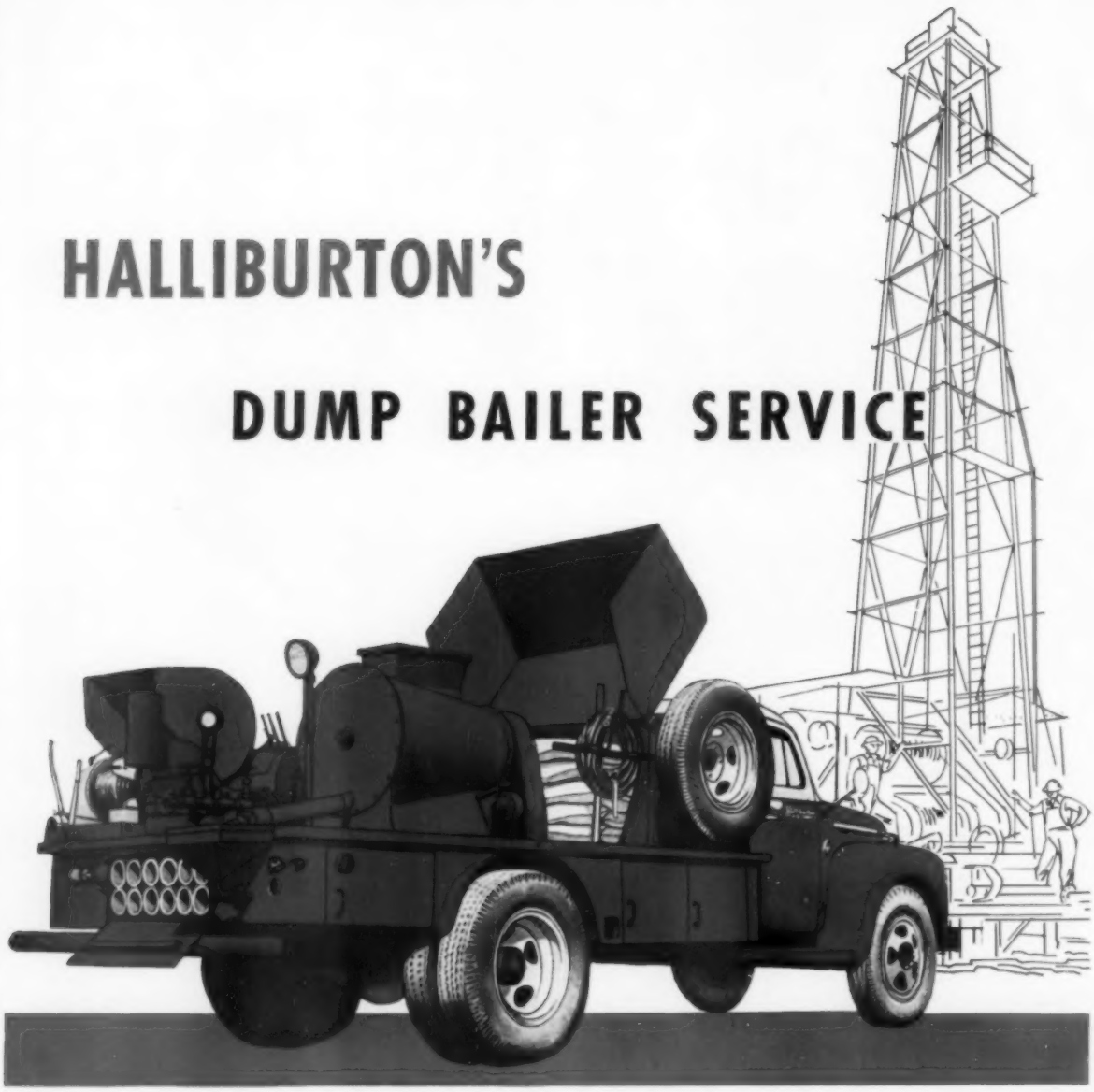
GOODYEAR

60th GOODYEAR ANNIVERSARY

THE GREATEST NAME IN RUBBER

HALLIBURTON'S

DUMP BAILER SERVICE



Here's a complete, smoothly integrated service, developed through 17 years of experience in remedial operations. It can save you valuable rig time and cut the cost of shot tamps, plug-backs, bridge plugs for pipe repairs, aluminum alloy removal and other odd jobs encountered in remedial work.

When you specify Halliburton's Dump Bailer Service, you gain the valuable benefits of Halliburton's developments in equipment and techniques. Placing gravel has been simplified. New equipment, using a special stuffing box and quick-change head, permits the operator to apply pressure for squeezing materials into formation or for other purposes while the bailers remain in the hole. Small knife-type bailer bottoms make it possible to perform dump bailer techniques inside tubing.

Whenever the need occurs: Put all the advantages of Halliburton's Dump Bailer Service into your well!

HALLIBURTON DB BRIDGING BASKET

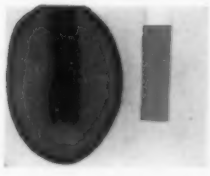
Makes remedial work off bottom of open hole or inside casing more economical. Attached to Bailer section by special adapter, it is lowered to any depth in open hole or casing with quick-setting materials in the Bailer, ready to be dumped. A slight pickup of the Bailer sets and opens the Bridging Basket and dumps the material simultaneously.

CAL-SEAL

A super-strength gypsum cement, manufactured and mixed with chemicals to insure a stabilized controlled set. Setting time can be accelerated or retarded to meet special conditions. Expansion upon setting produces a tight plug. Low permeability effectively keeps out unwanted gas or well fluids.

HYDROMITE

A proven waterproof plastic base gypsum cement. Unlike a regular cement slurry, the fluid phase of Hydromite contains a resin that sets up when squeezed out into the formation. Penetration is brought about by applying a differential pressure of 50 to 60 psi on the material when it is in contact with a porous permeable formation. This feature, plus expansion at time of initial set, makes Hydromite a superior, non-permeable plug for plugging off bottom hole water in producing wells.



RESIN-CEMENT

A blend of resins, water and portland cement, designed for open bottom hole plugs, setting around casing shoe or opposite water zones and other remedial work in oil or gas wells where ordinary cementing materials fail. Dump Bailers are used to place Resin-Cement in small volume or when it is not practical to pump through tubing. The set Resin-Cement is not attacked by oil, gas or formation water and will resist the action of common acids.

Don't put off the remedial work needed to help make your wells more profitable producers. Call your local Halliburton representative for discussion and assistance.

ASK FOR THE "DUMP BAILER SERVICES" BULLETIN

HALLIBURTON OIL WELL CEMENTING COMPANY, DUNCAN, OKLA.

284 SERVICE CENTERS...READY TO SERVE YOU—AROUND THE CLOCK

NEW!

WORLD'S FIRST OUTBOARD V-ENGINE

MEET THE SEA-HORSE V-50... THE JOHNSON THAT LAUNCHED THE V AGE IN OUTBOARDING!

It's a wonder under load . . . a 4-cylinder, 70.7 cubic inch, 50 hp "V" bomb! Inspired by the finest automotive V-engine design, it delivers blazing full thrust instantaneously!

What's more, the Sea-Horse V-50 brings "V" smoothness, silence and response to the working waterways. It's the most effortless, most efficient big motor ever built. And it's all new. From unit magneto and suction fuel pump to "rubber-floated" powerhead, spring-assisted tilt locks and premium long-life paint. If you want a rugged, all-purpose motor with a heart that's twice its displacement, this new "V" Sea-Horse is for you.

There's "V" value all through this year's Johnson line. From 3 to 50 hp, from $160 to $840, all eleven new Sea-Horses are models of dependability—worth more from take out to trade in. Why don't you go silent partners with a Sea-Horse. Your Johnson dealer's listed under "Outboard Motors" in the Yellow Pages. See him soon. Nearly two million dependable Sea-Horses prove Johnson knows best.

FREE 1958 Sea-Horse catalog! Write: Johnson Motors, 458 Pershing Road, Waukegan, Illinois. (Division of Outboard Marine Corporation. In Canada: manufactured by Johnson Motors, Peterborough, Ontario.)

NEW 4-CYLINDER SEA-HORSE V-50 — $740

- Whopping 70.7 cubic inch displacement—largest among popular outboards.
- Develops 50 hp at only 4000 rpm—has enormous capacity for load.
- New recirculating water cooling system—maintains ideal block temperature, lengthens engine life. New V-50 can run continuously in the coldest waters.
- New twin-barrel down draft single carburetor—only one high speed carburetor adjustment to make.

Prices f.o.b. factory, subject to change. OBC certified brake hp at 4000 rpm (18s and 35s at 4500).

First in dependability... pioneers of the "V" age engine

Johnson

ngineering Progress Report
FROM UNION CARBIDE CHEMICALS COMPANY

Side Stream Distillation Reduces Cost of Gas Sweetening Operations

Control monoethanolamine contamination by eliminating foreign materials

Monoethanolamine reacts with weak acids such as hydrogen sulfide and carbonic acid at ambient temperatures to form salts. Then, these salts decompose when heated to the boiling point of water, liberating the acidic gases and freeing the monoethanolamine for recirculation to pick up more acid gas. This provides an economic cyclic process for absorbing these undesirable materials from a gas stream. Because of this, practically all gas sweetening in the United States is accomplished by means of the ethanolamines. Union Carbide Chemicals Company's Technical Service Department is continually engaged in research designed to give better engineering service to users of CARBIDE's ethanolamines.

MOST UNITS ARE TROUBLE-FREE

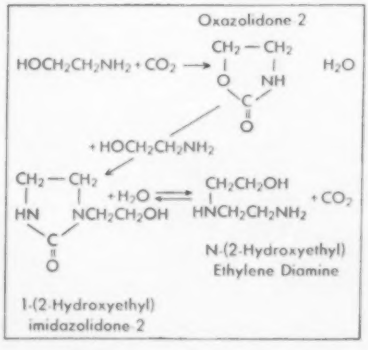
Most of these plants have operated for years without difficulty. However, experience with both aqueous-amine and glycol-amine solutions shows that in some plants the solution gradually loses capacity to absorb acidic gases and may become corrosive.

Research has shown that monoethanolamine contamination can be controlled by a simple side stream distillation system which removes foreign materials and amine degradation products. Thus, sewering can be avoided.

FORMATION OF AMINE DERIVATIVES

Examination of used aqueous and glycol-amine solutions led to the isolation and identification of two monoethanolamine conversion products, namely, 1-(2-hydroxyethyl) imidazolidone-2 and N-(2-hydroxyethyl) ethylene diamine.

It was found that this reaction actually takes place at a very slow rate in some plants handling carbon dioxide. A similar reaction



yielding similar products does not occur when only hydrogen sulfide is present.

EFFECT OF AMINE DERIVATIVES

Formation of imidazolidone reduces the effective monoethanolamine concentration and increases solution viscosity. High concentration may aggravate precipitation of residues in equipment. N-(2-hydroxyethyl) ethylene diamine will pick up acid gases, but release them only with difficulty. The acid gas salt of this stronger amine may contribute to plant equipment corrosion.

DEGRADATION PRODUCTS REMOVED BY SIDE STREAM DISTILLATION

Commercial experience proves that it is possible to remove the imidazolidone from fouled plant solutions by side stream distillation at atmospheric pressure. Batchwise operation handling approximately 1 per cent of the circulated solution has been successful. Vacuum distillation equipment has been equally successful in the case of glycol-amine solutions.

While the substituted ethylene diamine can be efficiently removed in aqueous monoethanolamine systems, it can not be removed from diethylene glycol-monoethanolamine mixtures as its boiling point is within a few degrees of that of diethylene glycol.

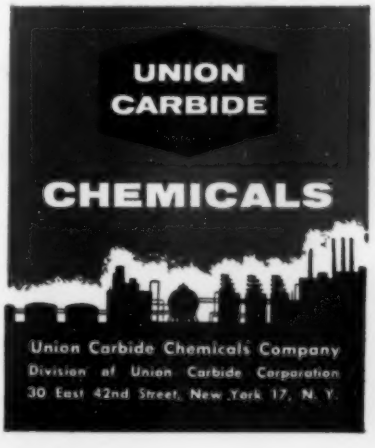
However, the imidazolidone and diamine are in equilibrium. Therefore, reduction of the imidazolidone concentration causes the diamine to revert to imidazolidone. This results in an ultimate removal of both the imidazolidone and the diamine.

In addition, side stream distillation also removes inorganic salts, organic materials with boiling points higher than monoethanolamine, and heat stable monoethanolamine-acid reaction products.

TECHNICAL SERVICE AVAILABLE

CARBIDE offers many technical services to the gas conditioning industry. If you have a gas treating problem, call the nearest CARBIDE technical representative or write Union Carbide Chemicals Company, Department B, 30 East 42nd Street, New York 17, New York.

"Union Carbide" is a registered trade-mark of Union Carbide Corporation


UNION CARBIDE
CHEMICALS
Union Carbide Chemicals Company
Division of Union Carbide Corporation
30 East 42nd Street, New York 17, N. Y.

INTERNATIONAL all-wheel-drive models cover the range from 7,000 lbs. GVW to 62,000 lbs. GCW in conventional and cab-forward design. There is one practically custom-built for every hauling job in the world's most complete truck line. Choice of load-moving and load-carrying components to keep operating and maintenance cost lowest. Above: INTERNATIONAL model A-120 (4x4) pickup.

"Western-built" conventional models range up to 76,800 lbs. GCW—are designed and built to haul maximum load over the toughest terrain with matchless ease and economy. Special design provides extra durability for long life and dependability. Choice of four- or six-wheelers . . . 7 diesel engines with from 175 to 335 hp. Shown here, the INTERNATIONAL model RDF-410 conventional 6-wheel diesel.

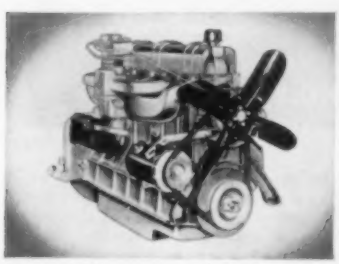
INTERNATIONAL TRUCKS

Traction when you need it!

Just one reason why oil men find International Trucks cost least to own!

Negotiate rougher terrain and hills. Carry more load in less time—cut operating expenses with all-wheel-drive.

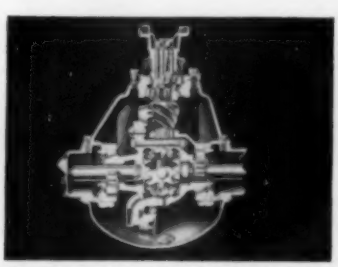
Superior strength Steel-Flex frames are test-proven to combine extra durability with proper flexibility.



Dependable power and fuel economy with INTERNATIONAL all-truck engines. Gasoline or LPG "sixes" to 212 hp.

Optional power take-off, factory-mounted on transfer case, transmits *full torque* of engine to auxiliary equipment.

Easy to handle in tight spots or on the roughest terrain with true geometric steering, cam and roller mounted gears.



Maximum load hauling, long life axles. Front and rear axles are full floating single reduction type.

INTERNATIONAL Trucks with *all-wheel-drive* are truck-built tough to make a road where there is none.

You get more traction, more sure-footed power because *all wheels are working*. They move you over sinkholes, mud, sand or snow . . . they grab hold to pull business-sized loads up the steepest grades.

What's more, *every* all-wheel-drive INTERNATIONAL Truck is all-truck manufactured in one plant. You get dependable performance that makes the most out of every workday, plus lasting economy of operation and long life. That's why INTERNATIONAL Trucks cost *least* to own.*

When you need a truck that's *built* to do a truck job better and longer remember the world's most complete truck line. Then see your INTERNATIONAL Dealer.

**Signed statements in our files, from fleet operators throughout the U.S., back up this statement.*

cost least to own!

INTERNATIONAL HARVESTER COMPANY, CHICAGO

Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

HOLCOMBE

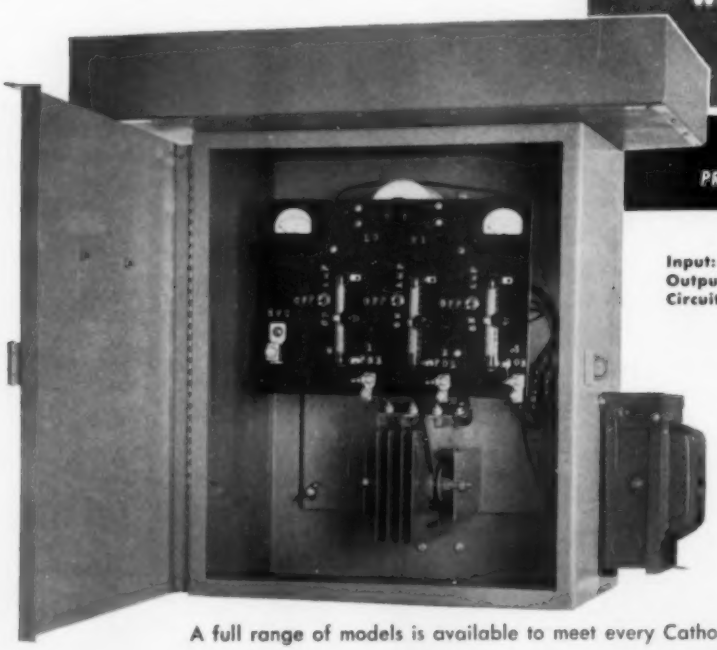
CATHODIC PROTECTION RECTIFIERS

C. P. CABLE • GRAPHITE ANODES • COKE BREEZE

PREVENT CORROSION OF WELL CASINGS, STORAGE TANKS, HEATER TREATERS, SALT WATER SYSTEMS AND PIPE LINES

SPECIALLY DESIGNED for oil field use, Holcombe rectifiers have behind them, the experience of hundreds of field installations and sixteen years development of corrosion prevention products. Each unit is individually load-tested before shipment.

THE HIGHEST QUALITY COMPONENTS
HIGH EFFICIENCY FACTOR
EASY TO INSTALL
READILY ACCESSIBLE
WEATHER PROOF
LONG WARRANTEE



MODEL USED FOR PROTECTION OF HEATER-TREATER.

Input: Any single phase voltage
Output: 6 volts 15 amperes D.C.
Circuits: 3 positive anode circuits, each rated at 5 amperes, individually adjustable, and individually metered.

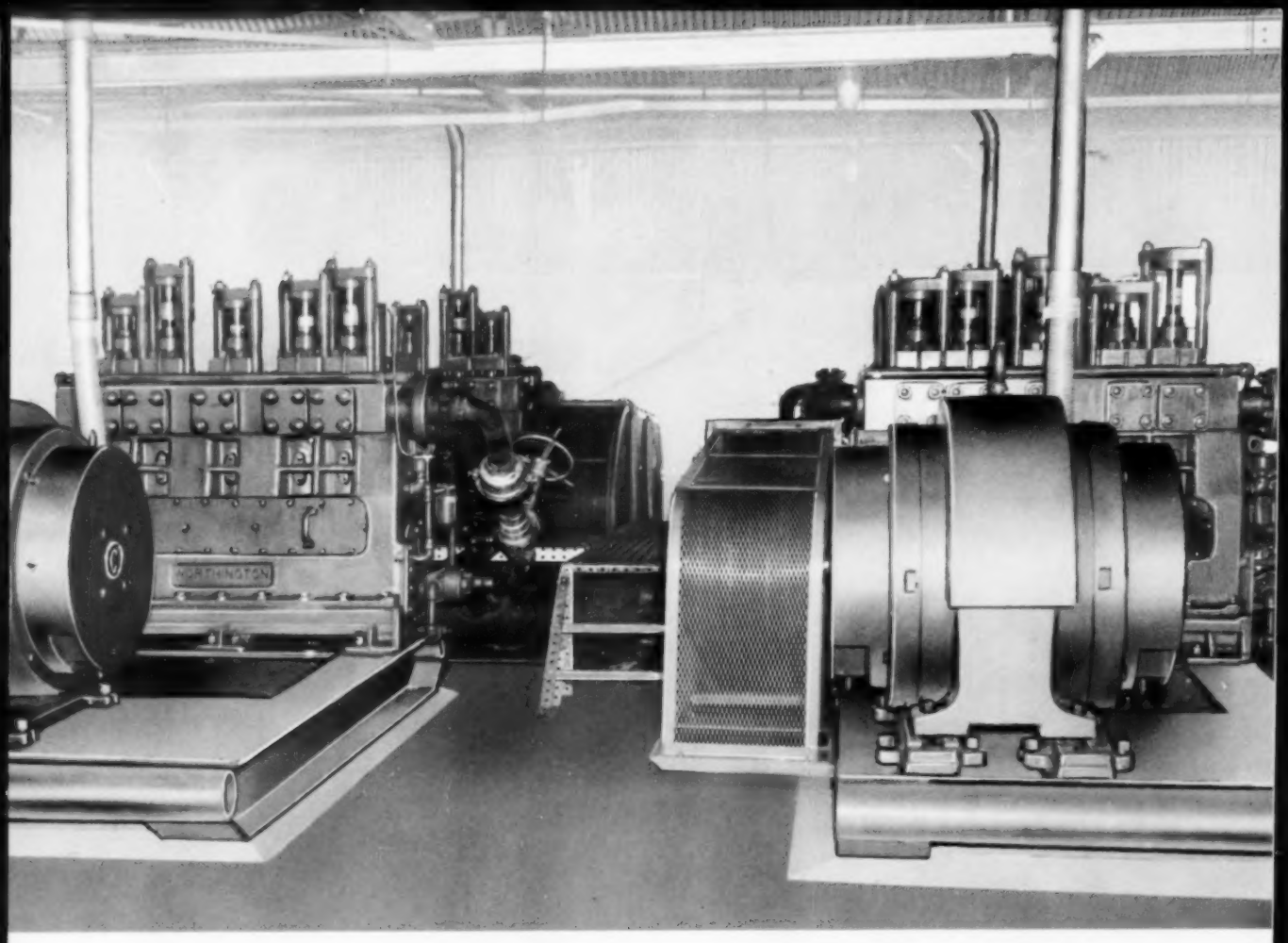
A full range of models is available to meet every Cathodic protection need.

Write for information on Holcombe Cathodic protection rectifiers.

THE HOLCOMBE COMPANY, INC.
FIRST NATIONAL BANK BUILDING TELEPHONE 5-3468 SHREVEPORT, LOUISIANA

HOLCOMBE COMPANY OF CANADA, INC.
323 BARKER BUILDING TELEPHONE 6-7291 CALGARY, ALBERTA, CANADA

LION COATINGS • HOLCOMBE SELENIUM RECTIFIERS
PIPE WRAPPINGS • GRAPHITE ANODES • COKE BREEZE



Flooding

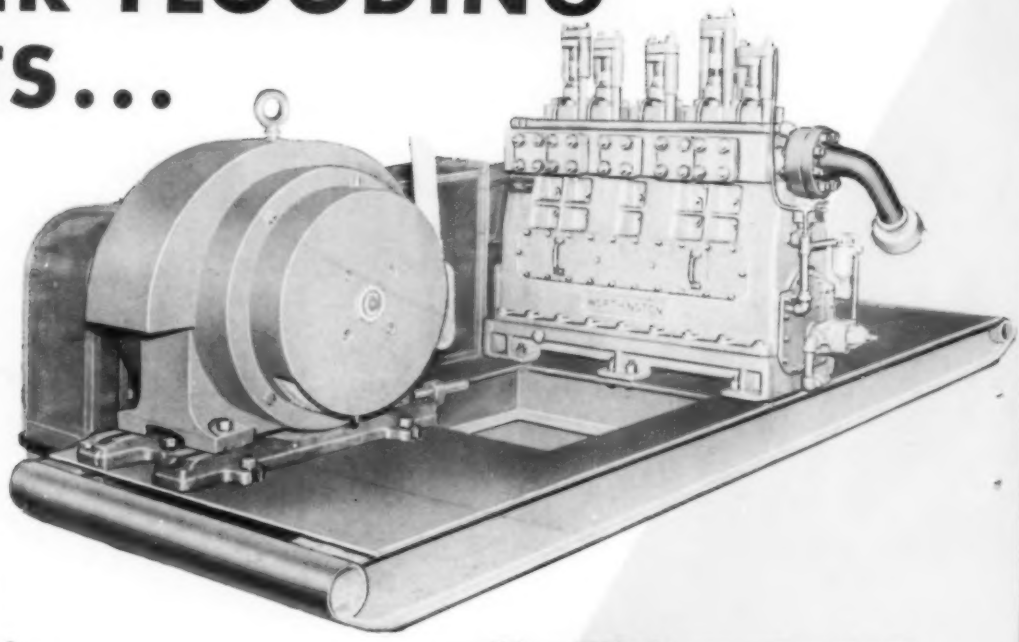
WITH J&L SUPPLY

Water flooding is simplified and the over-all operation goes more smoothly with J&L co-operation. This is not an idle statement.

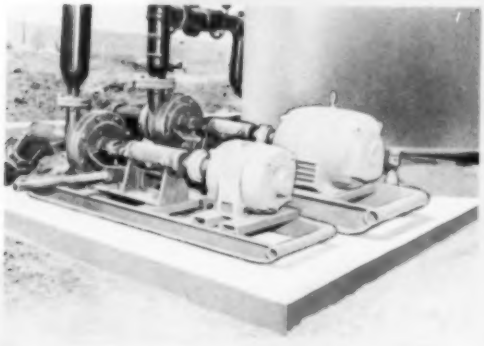
We have the know-how and equipment to design and build skid-mounted pump units to handle circulating, backwash or injection jobs with precise and economical efficiency.

We have the most suitable drilling and pumping equipment. Our J&L tubular goods include pipe *lined at the mill* with cement. Our supply service includes valves, fittings, meters, controls, pumps, motors, engines, feeders, tanks, filters — everything! Our store stocks for maintenance are complete and convenient. Our men understand your problems and earn your confidence.

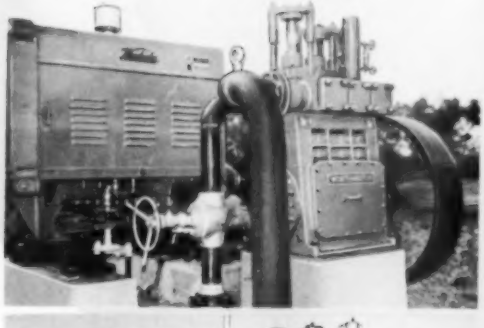
WATER FLOODING UNITS...



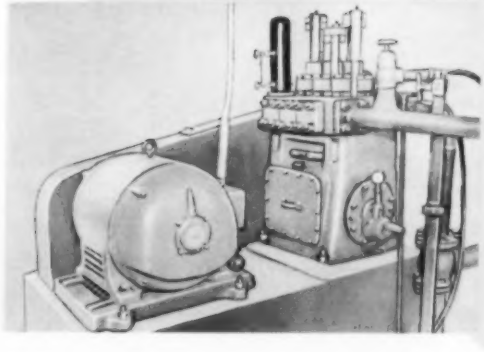
designed and built by J&L SUPPLY

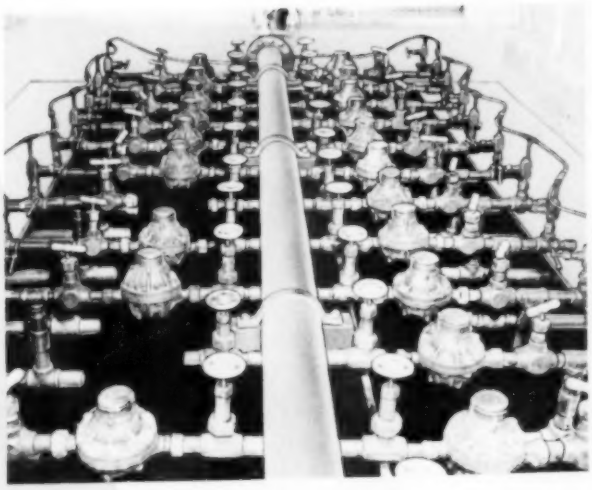


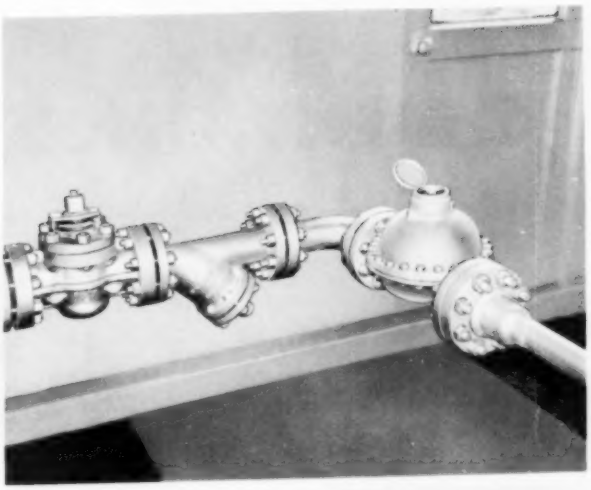
If it's a job around any water flooding project that can be handled with any properly fitted rotary, centrifugal, piston, or plunger pump. . . . If it's important — and it always is — to power that pump with precisely the right engine or electric motor. . . . In other words, if you want the utmost in efficiency and economy in a pump unit, you'll want it designed and tailor-made by J&L Supply.



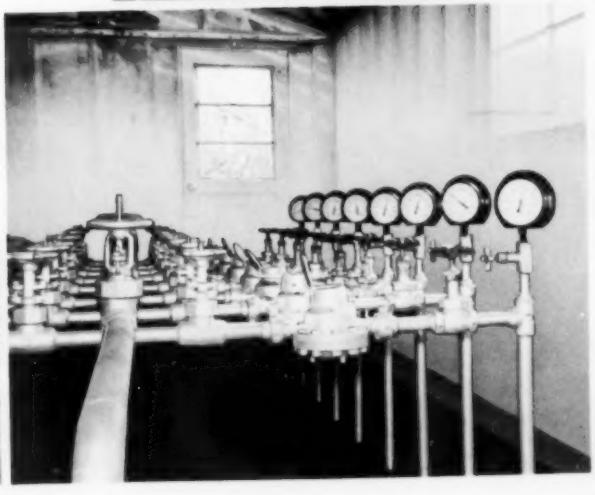
This tailored-to-measure service includes gas volume tanks, and pump, compressor and generator units for ANY oil country application. Call J&L Supply anywhere — our engineers will take over promptly.







If it's used in
WATER
FLOODING
your best source is
J&L SUPPLY



J&L Pipe
CEMENT LINED AT THE MILL

The lining of J&L Cement Lined Pipe is satin smooth, resulting in a lower friction coefficient and higher flow efficiency than for unlined pipe. Therefore, the carrying capacity is greater than steel pipe of the same I. D.

It is specifically designed, of course, for handling corrosive liquids.

It is ideal for flow lines, pipe lines, tubing and casing where salt water, hydrogen sulfide, carbon dioxide or other corrosives are present.

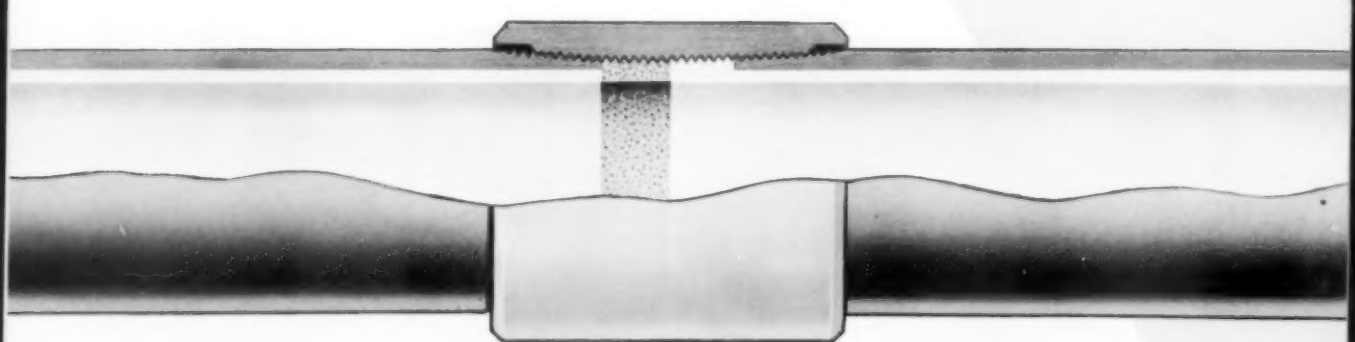
It is impervious to hot water that would cause tuberculation in ordinary pipe.

Fittings cement lined at the mill can be supplied — such as tees, ells, crosses, unions.

J&L Cement Lined Pipe requires no special handling. The satin-smooth lining withstands any exterior blow that does not dent or deform the steel.

Installation requires no special knowledge or skill. Field joints are made up with a sealing compound which is as corrosion resistant as the cement lining itself.

These joints can be made up and broken down as often as necessary. J&L pipe cement lined at the mill contributes materially to the success of water flooding. Discuss this with any J&L Supply man.



Jones & Laughlin

SUPPLY DIVISION – Tulsa

J&L – A GREAT NAME IN SUPPLIES

Why Suffer with Sulfur?

Less sulfur in the refinery stream means less corrosion and gum formation in process equipment . . . lower investment costs . . . less contamination of catalysts . . . less antagonism toward TEL . . . improved product odor, color, and stability . . . more profit in many ways for both the refiner and marketer.

Kellogg has the economic answer to high sulfur crudes. Working closely with the refiner's engineers, as it has done with those of leading oil companies on the East and Gulf Coasts—as well as in England, Belgium, France—Kellogg can design a unit to remove harmful sulfur compounds to almost any degree desired. In one typical instance, weight per cent was reduced from 0.84 to 0.08 in catalytic gas oil, and from 0.66 to 0.05 in furnace-oil distillate.

Optimum investment and operating costs are assured through designs that utilize selectively lower pressures, reduce the use of costly alloys such as 18-8, and lower the consumption of high pressure hydrogen.

Kellogg desulfurization units can be engineered to treat virgin streams of naphtha, kerosene, gas oil and other fuels, and cracked stocks of similar boiling ranges. Or units can be designed to operate simultaneously on streams from the topping and cracking units. Where desired, the design can include equipment to recover the sulfur as a salable by-product. Your inquiries will receive prompt attention.

REFINERY PROCESS DIVISION

The M. W. Kellogg Company

711 THIRD AVENUE, NEW YORK 17, N. Y.

A SUBSIDIARY OF PULLMAN INCORPORATED

The Canadian Kellogg Co. Ltd., Toronto • Kellogg International Corp., London • Kellogg Pan American Corp., N.Y. Societe Kellogg, Paris • Companhia Kellogg Brasileira, Rio de Janeiro • Compania Kellogg de Venezuela, Caracas

M KELLOGG W

FASTER ROUND TRIPS AT LESS COST

Since they switched to "Jimmy" Diesels

"General Motors Diesels cost less and have the reserve power and stamina to meet our every drilling requirement." That's why Sierra Petroleum Company, Inc., of Wichita, Kansas, who installed their first GM Diesel on a rig in 1951, have standardized on "Jimmy" Diesel "Twins" ever since.

Says Driller Glen Ulrich, "The extra snap of acceleration with a 'Jimmy' Diesel lets us make round trips in less time than ever dreamed possible with other power plants used. Portability is another important feature—the Twin-powered draw works and mud pump are each moved as units with their engines intact, thus cutting set-up and tear-down time. Measuring 19' and 21' respectively, these units fit within Kansas highway length limits."

If you're hunting for ways to offset rising production costs, better look into the savings you can make with GM 2-cycle Diesels. Single engines—30 to 300 H.P.; multiple units—up to 893 H.P. Call your GM Diesel distributor, or write us.

DETROIT DIESEL Engine Division of General Motors, Detroit 28, Michigan

GM DETROIT DIESEL POWER

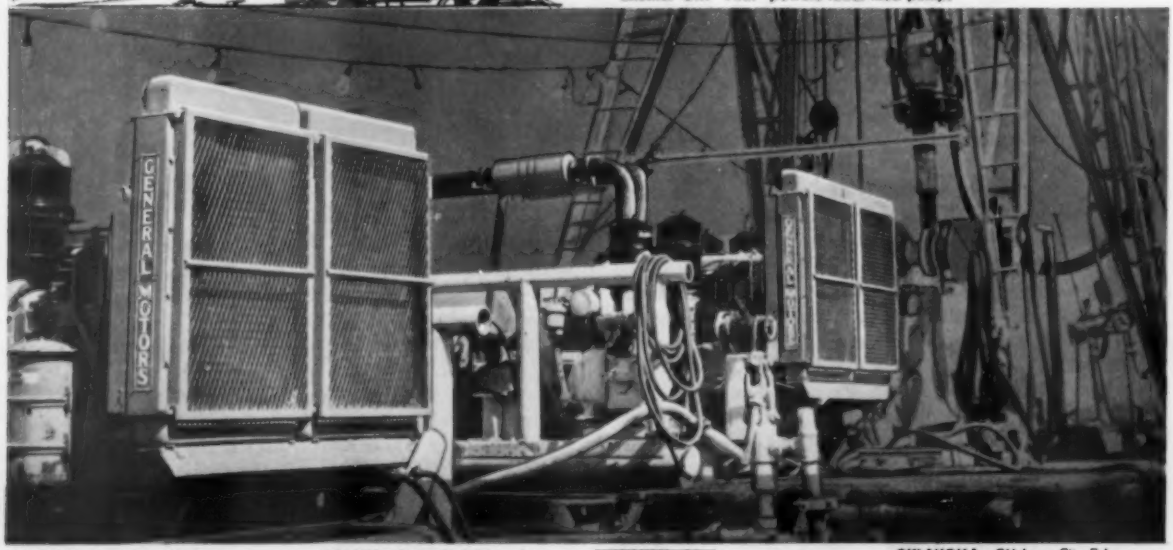
Regional Offices: New York, Atlanta, Detroit, Chicago Dallas, San Francisco

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

Now—more than ever—it pays to standardize on GM Diesel—available in 1485 applications of power equipment built by more than 175 manufacturers

Parts and Service Worldwide

Sierra Rig #7 drilling 570' per day near South Palico, Kansas. GM "Twin 6-71" TORQMATIC unit drives N-45 Brewster draw works; another GM "Twin" powers Ideal mud pump.



ALABAMA—Birmingham, Montgomery
ARMSTRONG EQUIPMENT CO.
Mobile
KENNEDY MARINE ENGINE CO.

ARIZONA—Phoenix
THE DIESEL SERVICE COMPANY

CALIFORNIA—El Monte, Long Branch, Los Angeles
ANDERSON-O'BRIEN CO.

COLORADO—Denver
THE COLORADO BUILDERS' SUPPLY CO.

FLORIDA—Jacksonville, Miami
DETROIT DIESEL ENGINE DIVISION
General Motors Corporation
(Florida Branch)

ILLINOIS—Mt. Carmel
WESTERN SERVICES, INC.

INDIANA—Evansville, Indianapolis
REID-HOLCOMB CO., INC.

IOWA—Ankeny
HICKLIN GM DIESEL, INC.

KANSAS—Great Bend, Wichita
DIESEL EQUIPMENT CO., INC.

KENTUCKY—Lexington, Louisville, Madisonville
BOGIE EQUIPMENT CO.

LOUISIANA—Harvey
GEORGE ENGINE CO., INC.
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UNITED ENGINES, INC.

MICHIGAN—Detroit, Grand Rapids
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WEST VIRGINIA—So. Charleston, Fairmont
RAY C. CALL, INC.

IN CANADA—Distributors in all key locations under
GENERAL MOTORS DIESEL LIMITED
London, Ontario

For Maximum Return On Your Gas Condensate Wells*...

Buy BS&B Model GDH

BS&B COLD-FRAC SYSTEM

With Hydrate Inhibitor

A Texas producer, who recently put on stream the BS&B Model GDH "COLD-FRAC" Unit shown below, was able to increase the condensate recovery from his gas production *by 27.5%* over conventional stage separation, based on the following operating data:

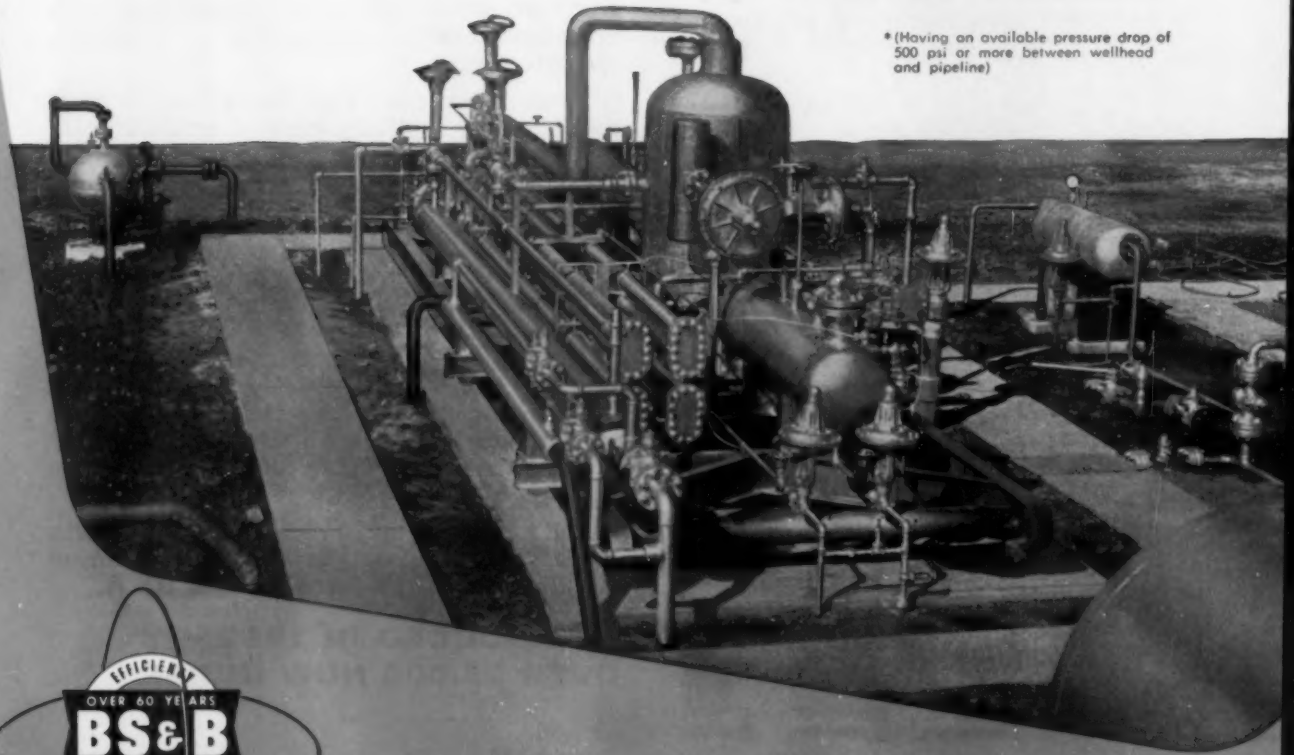
Low Temperature Separator:
Operated at 900 psig and 15° F. top — 65° F. bottom.

Stabilizer:
Operated at 80 psig and 215° F.

Gas Capacity:
Operated at 10 MMSCFD (average for 1 month) and 2000 psig, 75° F.

If *you* are now producing a gas condensate well or group of wells without benefit of a BS&B Model GDH "COLD-FRAC" Unit, your nearby BS&B Man will be glad to provide a complete engineering analysis of your production to determine the potential increase in condensate recovery one of these units could give you. Why not call him today?

* (Having an available pressure drop of 500 psi or more between wellhead and pipeline)



EFFICIENCY OVER 60 YEARS BS&B RELIABILITY
ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

BLACK, SIVALLS & BRYSON, INC.
Oilfield Equipment Division, Dept. 1-A2
P. O. Box 1714 Oklahoma City, Oklahoma

CONSOTROL* RECORDING

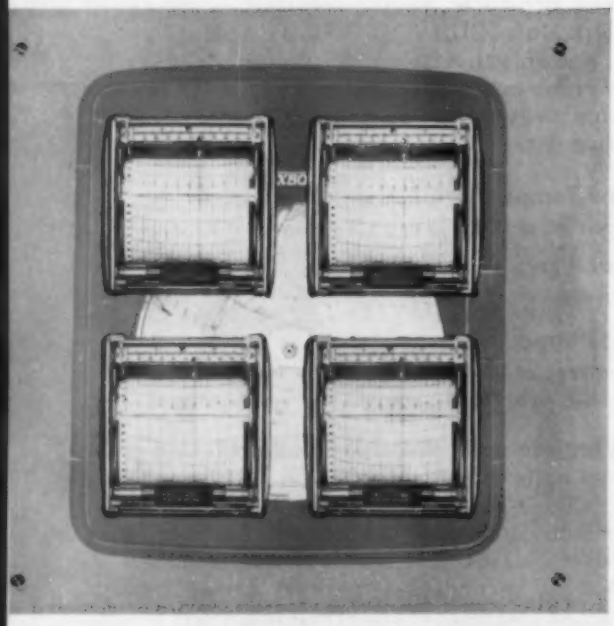


Illustration shows how 4 Consotrol Instruments require less panel space than does a single, conventional 12" recorder.

The ORIGINAL small-case control panel instrument with a FULL SCALE 4 INCH CHART...

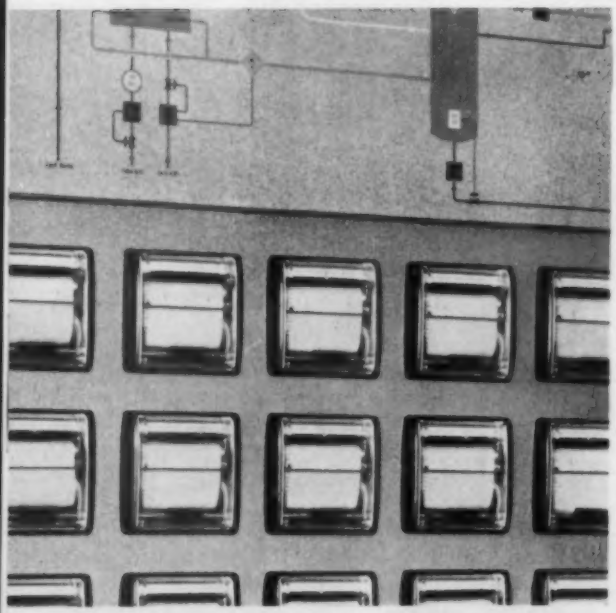
Full-scale *readability!* Here is the industry standard set by Consotrol Instruments, with no compromise in compactness, convenience, or performance.

These Recorders and Recording Control Stations are so compact you can actually mount 4 in the space required by 1 standard 12-inch recorder. And yet, inside the case, all components are full size — nothing is "miniature."

With the integrally mounted Model 58 Controller, the Foxboro Consotrol Recording Control Station provides precise, dependable control and full-scale chart records in one-quarter the panel space. Maintenance is easier too, with all calibration adjustments made from the front . . . re-inking needed only twice a year . . . chart changes as seldom as once a month.

For the complete story, write for Bulletin 13-18. **The Foxboro Company, 602 Neponset Avenue, Foxboro, Massachusetts, U.S.A.**

INTRODUCED IN 1952 — OVER 25,000 NOW IN USE



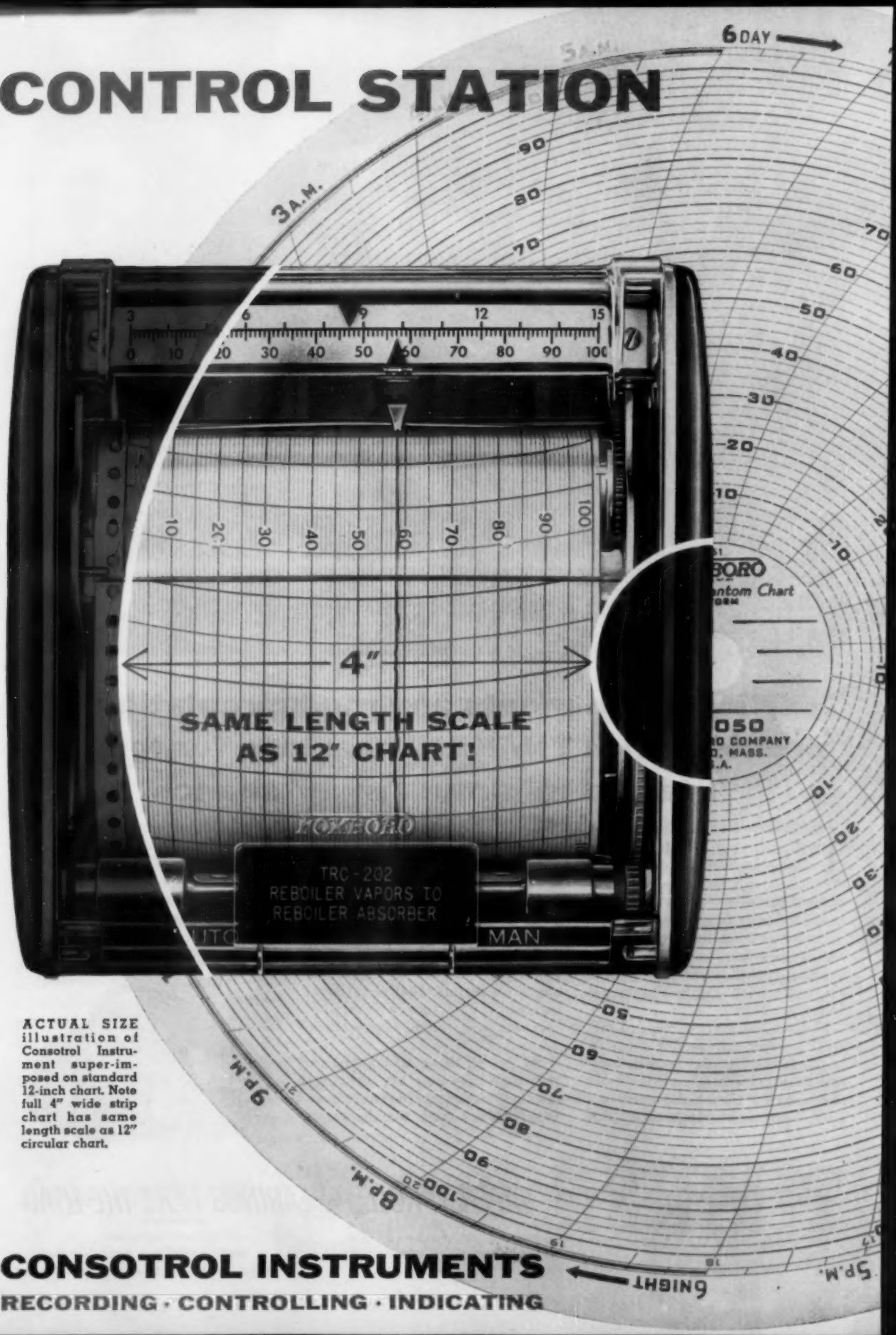
Typical control panel showing Consotrol Recording Control Stations. Associated M/58 Controllers, integrally mounted, pull out with the recorders.

*Reg. U.S. Pat. Off.

FOXBORO

REG. U.S. PAT. OFF.

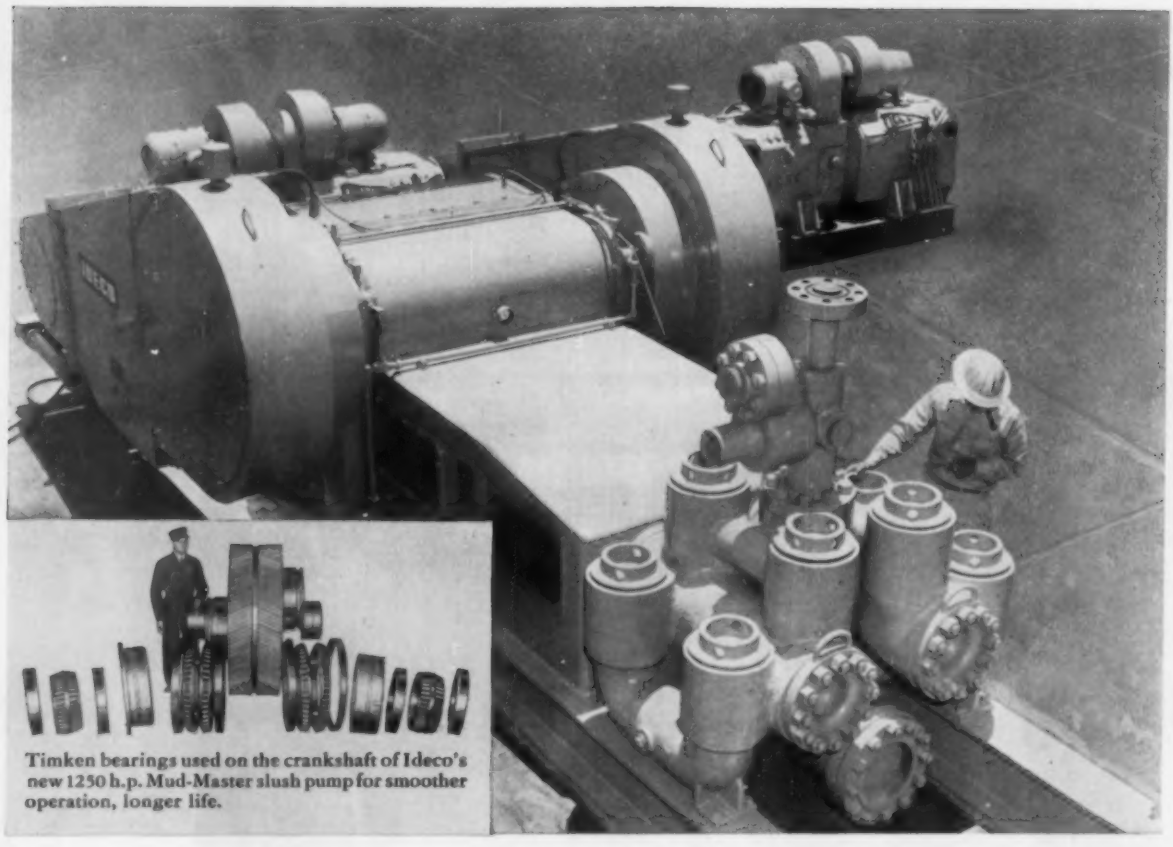
CONTROL STATION



ACTUAL SIZE illustration of Consotrol Instrument super-imposed on standard 12-inch chart. Note full 4" wide strip chart has same length scale as 12" circular chart.

CONSOTROL INSTRUMENTS

RECORDING · CONTROLLING · INDICATING



Timken bearings used on the crankshaft of Ideco's new 1250 h.p. Mud-Master slush pump for smoother operation, longer life.

New pump meets any mud circulation problem with TIMKEN® bearings for longer life and minimum maintenance

THIS new 1250 h.p. Mud-Master slush pump built by Ideco meets the increasingly heavy hydraulic requirements of deep oil well drilling. Because it's designed for sustained trouble-free operation under highest pressure conditions, Ideco engineers equipped its entire crankshaft assembly with Timken® tapered roller bearings.

Makers and users of rugged oil-well equipment specify Timken bearings because they provide long life with minimum maintenance. Because of their tapered construction, Timken bearings take both *radial and thrust loads,* or any combination. And full line contact between rollers and races gives them load-carrying capacity to spare. They hold the crankshaft in rigid alignment, minimize deflection and end-play that wear down related parts. And Timken bearings take shock loads, too. They're case-carburized for hard, wear-resistant surfaces over tough, shock-resistant cores.

To get all these advantages for the machinery you buy or build, specify Timken tapered roller bearings. Always look for the trademark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

Circulating cooling tower water round-the-clock in Union Oil's refinery at Cutbank, Mont., is the job of these six International U-264-6 power units. These engines have 264 cu. in. piston displ. and produce up to 54 continuous-load hp on natural gas.

Six heavy-duty Internationals replace short-lived auto engines at Union Oil

Company puts rugged natural gas U-264-6's on refinery pumps after lightweight, high-speed engines last only 2 years

The Union Oil Co. discovered a simple way to reduce pump power costs substantially in the firm's Cutbank, Mont., refinery. High-speed, short-lived automotive engines were replaced with heavy-duty International U-264-6 six-cylinder industrial engines.

Maintenance costs proved the lightweight auto engines didn't measure up to Union's power need—pumping cooling tower water. Engines usually wore out in two years' time. So Union switched to International U-264-6's and a full measure of low-cost dependable hp.

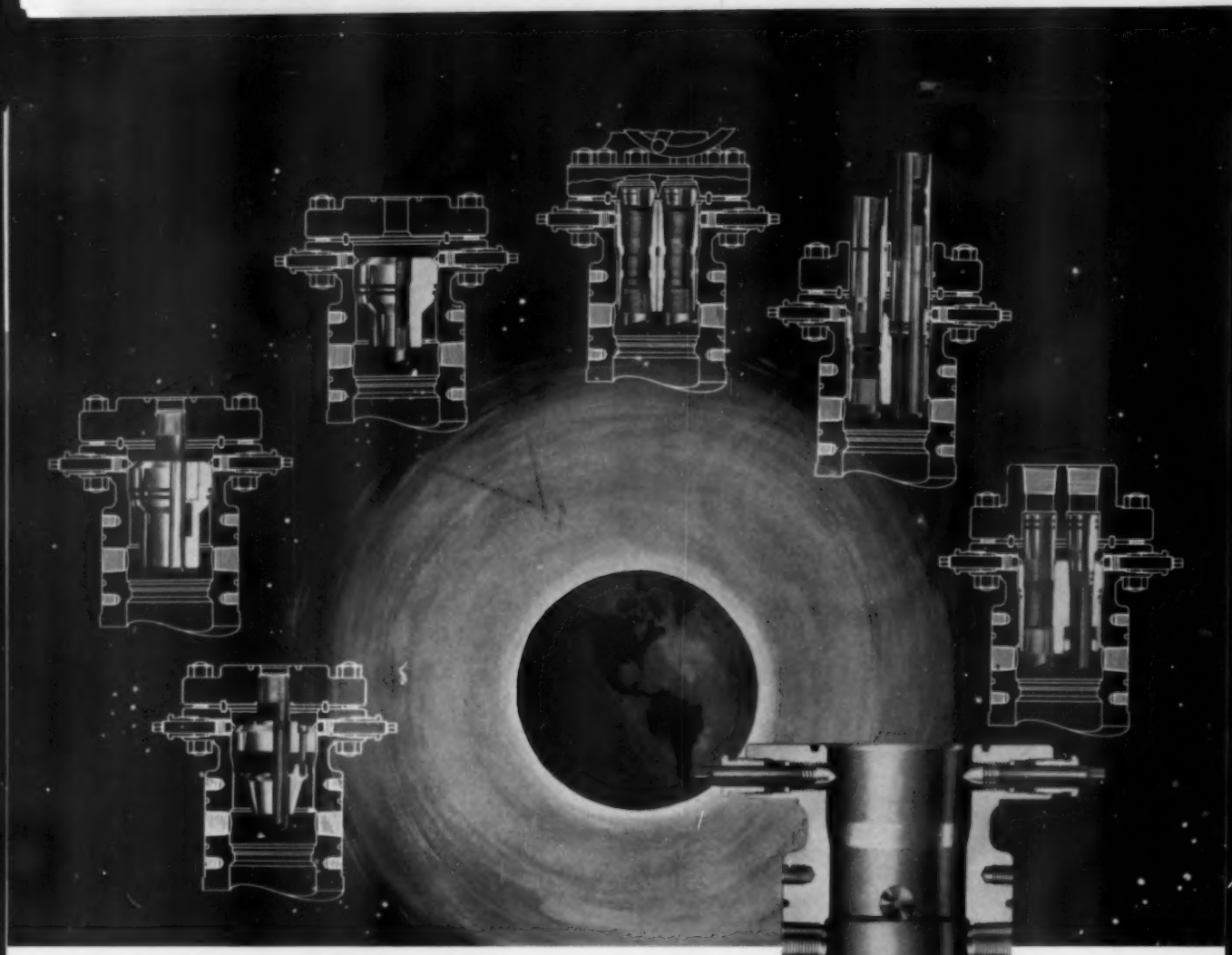
You can get the same long-life, low-maintenance performance from any of six compact International 6-cylinder carbureted oil field engines. Here's why: flexible economical power with fuel saving combustion chambers; efficient valve-in-head design; smooth power with counterbalanced crankshaft and heavy flywheel; full-pressure lubrication for minimum maintenance; your choice of carburetion—gasoline, LPG, or natural gas; rugged attachments that fit the IH engine to your job.

See your nearby International Power Unit Distributor or Dealer before you buy. He sells 21 carbureted and diesel engines ranging from 16.5 to 265 hp and he backs what he sells with very special service when you need it.

International® *Construction Equipment*

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.



O·C·T HAS MADE NEWS!

. . . the FIRST Universal Tubing Head for DUAL STRING or SINGLE STRING completions . . .

Now, for the first time, it is possible to install a tubing head which has a complete line of interchangeable dual string and single string tubing hangers.

The O-C-T Universal Tubing Head is versatile . . . because an operator may singly or dually complete a well at will with complete control throughout the operation.

The complete range of interchangeable tubing hangers possible with this revolutionary tool means that any last minute change in complete procedures (from single to dual or vice versa) can be made without changing tubing heads or using special attachments.

In short this is the answer to an industry demand—

● Control at all times ● Versatility ● Ease of installation ● Economy ● Wide range (600 through 2900 series, flange sizes from 6" to 10")

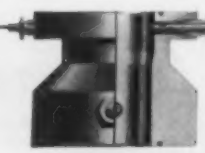
We will be glad to send complete information on request.

where progress is a daily practice.....

O·C·T

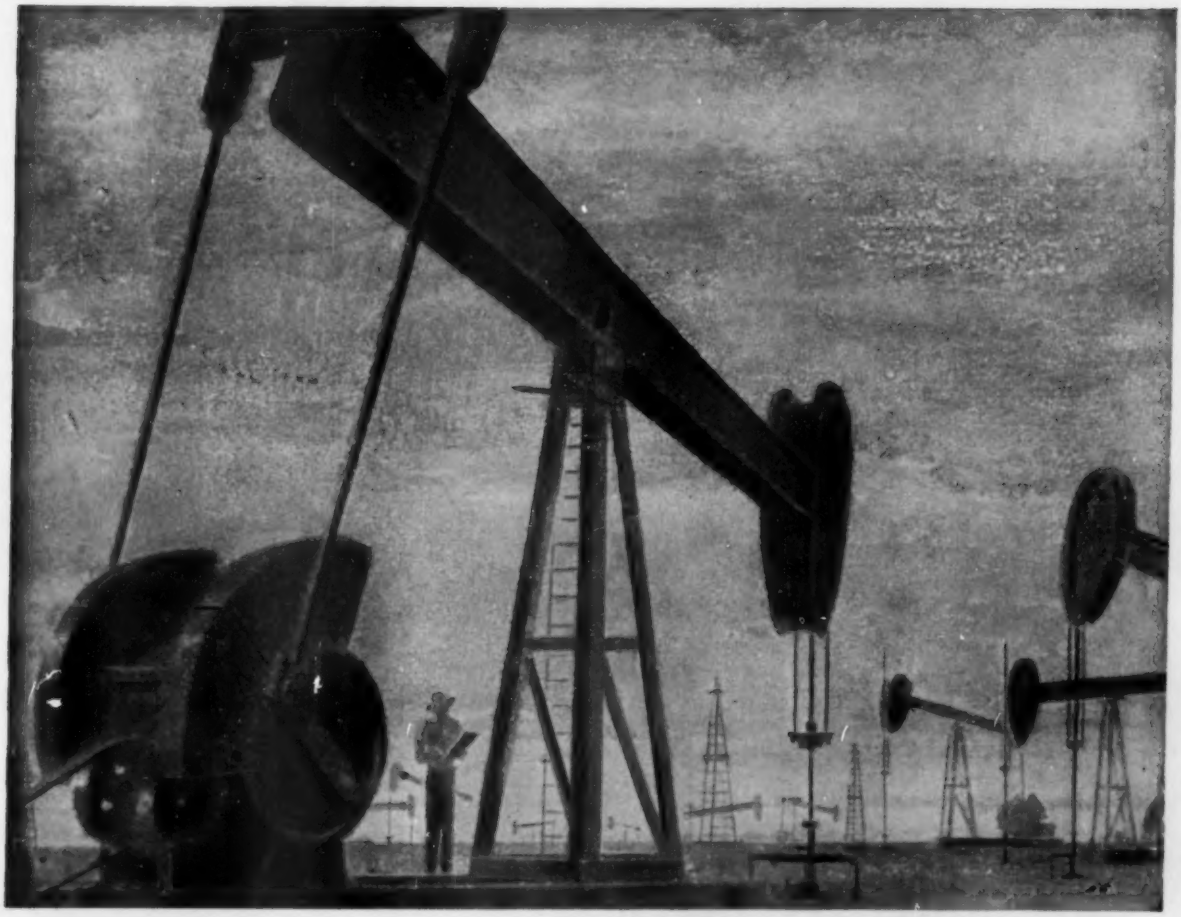
OIL CENTER TOOL CO.

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

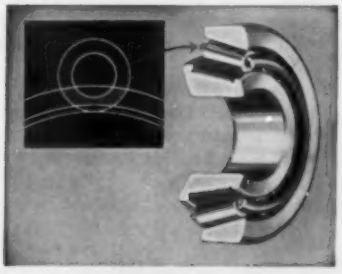


This "UA" attachment adapts conventional A.P.I. Tubing Heads so they may be used with any dual string and single string "U" Hangers. A saving can be realized because the attachments cost less than the Universal Tubing Head.

Export Representatives: South America — East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.



Built to stand up . . . under 'round-the-clock pressure!



HIGHER FLANGE IMPROVES ROLLER ALIGNMENT

As shown by the gray area above, the higher flange provides a large two-zone contact area for the roller heads. This greatly reduces wear—practically eliminates "end play". Larger oil groove provides positive lubrication.

The flow of America's vital oil can't be regulated by a time clock! These bobbing pumps work around the clock, around the year—with virtually no attention whatever! Dependable Bower Roller Bearings are more than proving their ability to stand this back-breaking pace—doing it with a minimum of maintenance cost and down-time. That's because important Bower Spher-O-Honed design features, like the one shown at left, have reduced bearing failure to a rarity. Whatever test *you* put them to—tractors, machine tools, jet engines—you'll find that Bower Spher-O-Honed Bearings will last longer and operate more efficiently. Let a Bower engineer show you the many advanced design features and superior quality of the complete Bower line. There are tapered, straight and journal roller bearings for every field of transportation and industry.

BOWER ROLLER BEARING DIVISION
FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 14, MICHIGAN

BOWER ROLLER BEARINGS

They Say—

Venezuelan imports vital

"Considerable concern is now felt in Venezuela regarding the possibility of future restrictions of U. S. petroleum imports, which might well impair the health of the oil industry.

"Approximately 65 per cent of the industry's production is accounted for by U. S. firms. Venezuela's oil was vital to the U. S. in the fighting of World War II and in Korea. Its importance to the western world was again demonstrated during the Suez crisis.

"Furthermore, through the sale of its oil, Venezuela has been able to earn dollars that make it one of the richest markets in the world for U. S. exporters. In 1957 Venezuela's purchase of goods and services from the United States exceeded $1 billion.

"As a North American oil man representing the largest U. S. producing company in Venezuela, I believe that the time has come to pay greater attention to the importance of Venezuelan oil in the security picture of the U. S., the Western Hemisphere and the free world. Any further restrictive measures which would further curtail Venezuelan production might well have a serious effect upon the ability of this country to produce the oil that would be needed to deal with any future emergency."

H. W. Haight, president, Creole Petroleum Corp., in a report on Venezuelan oil production.

Uncle Sam sets bad example

"At considerable sacrifice, Sinclair is complying with the voluntary oil import program and we would like to see it succeed. We believe that the integrity and the effectiveness of this governmentally sponsored program are seriously threatened by the continued failure of government itself to procure its substantial requirements of petroleum products from domestic sources instead of buying products refined from foreign crudes in foreign refineries and purchased in foreign markets, a sizable volume of which is imported duty-free into the United States. . .

"Recent developments in the government-military offshore procurement program pose an immediate threat to the already weakened price structure of domestic crude oil. . .

"Unless immediate, effective remedies are applied, the inconsistent position of Government in sponsoring voluntary crude oil import restrictions while itself indulging in actions hostile to this objective will imperil the whole voluntary oil import program.

"We respectfully urge that . . . the present voluntary oil import plan include a mandatory cooperative move by Government to procure maximum petroleum product supplies for governmental use from domestic sources."

James E. Dyer, former president, Sinclair Refining Co., and vice chairman, Sinclair Oil Corp., in a telegram to Capt. M. V. Carson, import plan administrator.

How to stay out of doghouse

"No responsible person within the industry can afford to act carelessly or thoughtlessly; one such action can undo in a single moment the sustained effort of many thousands to create good will toward the industry . . .

"Good public relations are primarily the result of personal contact and are based on what people do, not what

Smithco pioneered the development of this rugged cooler for severe application. Its functional design, with *excess* cooling capacity, has met and overcome *every challenge* of extreme weather and operating conditions.

The "D" series cooler, latest in the growing tradition of fine Smithco Air Coolers, combines years of qualified engineering experience with the newest manufacturing methods to give you the most dependable unit in it's field.

Their reputation for dependability has attained for Smithco coolers industry wide usage and universal recognition.

Plant & Offices — Tulsa, Oklahoma
P. O. Box 3217

Representatives in the Petroleum Industry

SMITHCO
Engineering Inc.

ANNOUNCING

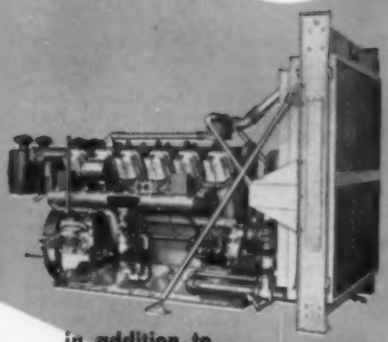
the appointment of

WAUKESHA SALES & SERVICE, INC.

as distributors for.....climax

BLUE STREAK ENGINES

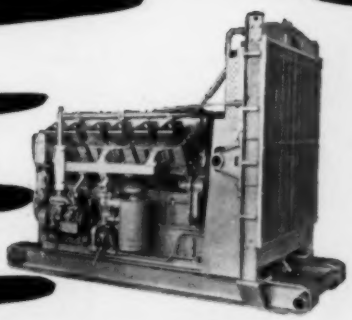
. . . and parts and service



in addition to

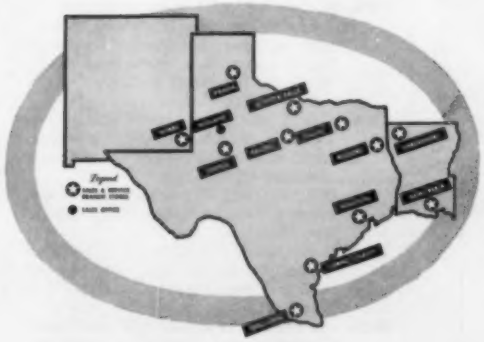
Waukesha

and all other present equipment lines



● Waukesha Motor Company has recently purchased the Climax Engines Manufacturing Company. Waukesha Sales & Service, Inc. will handle both lines throughout our present sales and service territory.

The addition of Climax gas engines, ranging up to 600 horsepower, enables us to offer engines for services requiring power capacities intermediate between the ratings of many of our existing models.



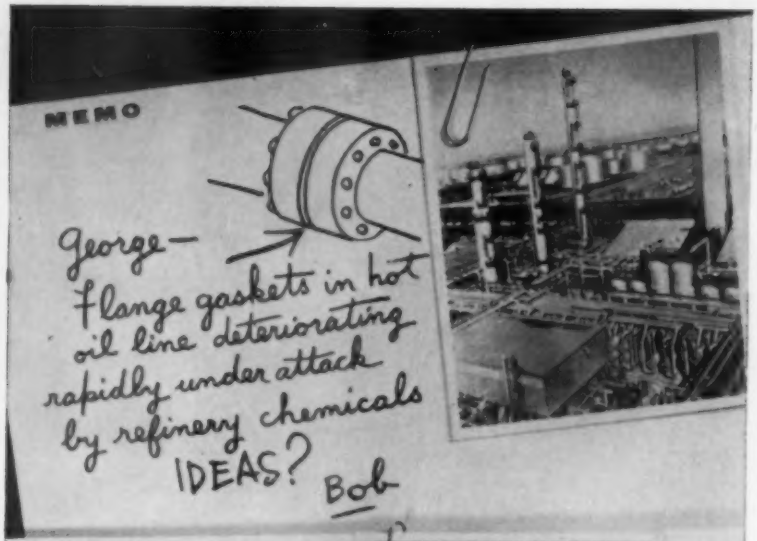
Service is Our most important product

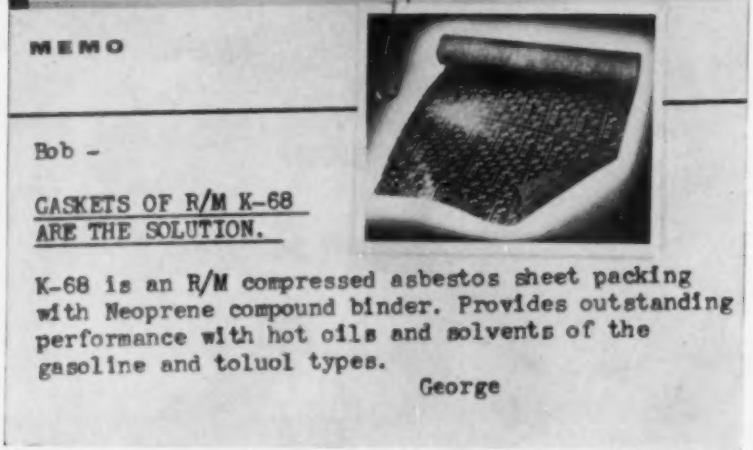
WAUKESHA SALES & SERVICE, INC.

1422 Maury Street, Houston, Texas

EXCLUSIVE DISTRIBUTORS FOR WAUKESHA PRODUCTS IN TEXAS, NORTH AND WESTERN LOUISIANA, SOUTHERN ARKANSAS AND NEW MEXICO

WORLD'S LARGEST DISTRIBUTOR OF OIL FIELD ENGINES




MEMO
Bob -
GASKETS OF R/M K-68 ARE THE SOLUTION.
K-68 is an R/M compressed asbestos sheet packing with Neoprene compound binder. Provides outstanding performance with hot oils and solvents of the gasoline and toluol types.
George

You can rely on Raybestos-Manhattan for the gasket materials to meet any of your needs. R/M K-68,® for example —for high pressures and temperatures, cold oil, carbon dioxide and ammonia.

In addition to K-68, R/M manufactures other Neoprene-compounded sheets in a wide selection of hardnesses and densities. Also meeting difficult requirements is R/M No. 10,000, the strongest compressed asbestos sheet packing on the market. Made entirely of Canadian long crude asbestos fibers and the best grade of natural rubber, its average tensile strength is 10,000 psi. In another category, asbestos cloths impregnated with "Teflon"* resist attack by all known industrial acids and caustics, and sheets of pure "Teflon" are impervious to such attack.

R/M engineers have amassed a wealth of experience in manufacturing packings and gasket materials to satisfy the most exacting requirements of the petroleum industry. This experience is at your disposal—call on R/M!

R/M MAKES A COMPLETE LINE OF MECHANICAL PACKINGS—including Vee-Flex, Vee-Square®, Universal Plastic, and "versi-pak"®; GASKET MATERIALS; "TEFLON" PRODUCTS. SEE YOUR R/M DISTRIBUTOR.
*A Du Pont trademark

R/M PACKINGS
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, PASSAIC, N.J.
MECHANICAL PACKINGS AND GASKET MATERIALS

RAYBESTOS-MANHATTAN, INC., Mechanical Packings • Asbestos Textiles • Industrial Rubber • Engineered Plastics Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings Brake Blocks • Clutch Facings • Industrial Adhesives • Bowling Balls • Laundry Pads and Covers

they say. To be fully effective, public relations have to be person-to-person."

Kerryn King, manager of public and industrial relations, The Texas Co., in a speech to the Kentucky Petroleum Marketers Association.

CALENDAR

JANUARY

20-21 Compressed Gas Association, Inc., forty-fifth annual meeting, Waldorf-Astoria, New York.

21 Indiana Oil and Gas Association, American Petroleum Institute Illinois Basin chapter, joint winter meeting, McCurdy Hotel, Evansville, Ind.

24 Southern Gas Association, transmission section roundtable conference on pipeline engineering, Hilton Hotel, El Paso, Tex.

29-31 Ninth annual Institute on the Law of Oil and Gas Taxation, sponsored by Southwestern Legal Center, Dallas.

31 Natural Gasoline Association of America, regional meeting, Skirvin Hotel, Oklahoma City.

FEBRUARY

3-4 Instrument Society of America, chemical and petroleum industry symposium on progress and trends in chemical and petroleum instrumentation, Hotel Du Pont, Wilmington, Del.

5-6 Western Petroleum Refiners Association, Gulf Coast regional technical-industrial relations meeting, Ben Milam Hotel, Houston.

12-14 National Association of Corrosion Engineers, Tulsa section, ninth annual corrosion short course for pipeliners, Mayo Hotel, Tulsa.

13-15 National Society of Professional Engineers, spring meeting, Michigan State University, East Lansing, Mich.

16-20 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Hotel Statler, New York.

20-22 Pipe Line Contractors' Association of Canada, annual convention, Empress Hotel, Victoria, B. C.

24-28 American Society of Civil Engineers, annual convention, Sherman Hotel, Chicago.

26-28 American Petroleum Institute, Division of Production, southern district meeting, Shamrock-Hilton Hotel, Houston.

28 Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

3-4 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fourth annual joint meeting of Rocky Mountain petroleum sections, Cosmopolitan Hotel, Denver.

5-6 Gas Conditioning conference, sponsored by the University of Oklahoma, Oklahoma Memorial Union Building, Norman, Okla.

7 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

7-8 American Association of Petroleum Geologists, Pacific Coast section, annual meeting, Ambassador Hotel, Los Angeles.

10-13 American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists, forty-third annual meeting, Biltmore Hotel, Los Angeles.

Here's a new, fast way to pinpoint thief zones

the Schlumberger LOST CIRCULATION DETECTOR

Effective treatment of a thief zone can be accomplished only when you know exactly where that zone is . . . and now you do not have to pump away costly drilling fluid to locate the thief zone.

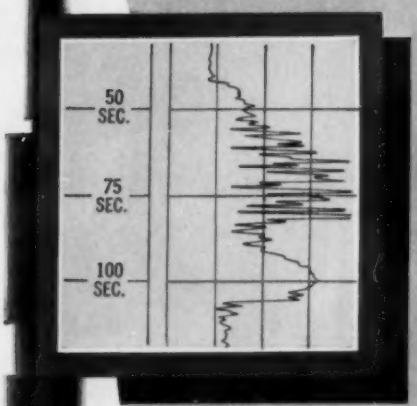
The Schlumberger Lost Circulation Detector can pinpoint any thief zone within one foot.

The Detector has shown that while lost circulation often occurs at the point of bit penetration, it will, in many cases, occur at some distance above the drilling depth; sometimes as much as several thousand feet.

In such cases, you can minimize ineffective and costly treatments if the zone of loss is first correctly identified. Treatment can then be effected at the exact location of the thief, the first time, rather than hundreds of feet up or down the hole.

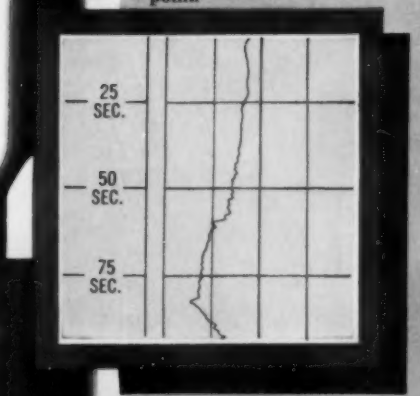
The average lost circulation survey can be accomplished in about one hour.

At the first sign of lost circulation, run the Schlumberger Lost Circulation Detector! It can be a real time and money saver for you. Ask your Schlumberger representative today for the new, descriptive folder which gives complete information on this new tool and its operation.



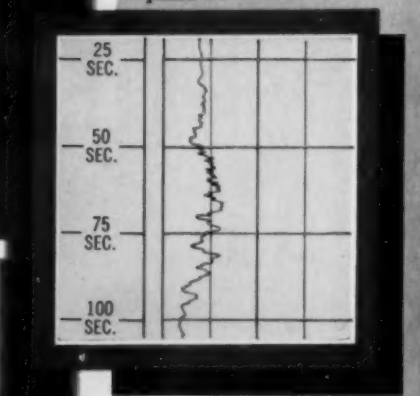
INSTRUMENT AT 9414'

Time graph shows fluid flow through detector . . . thief zone below this point.



INSTRUMENT AT 9428'

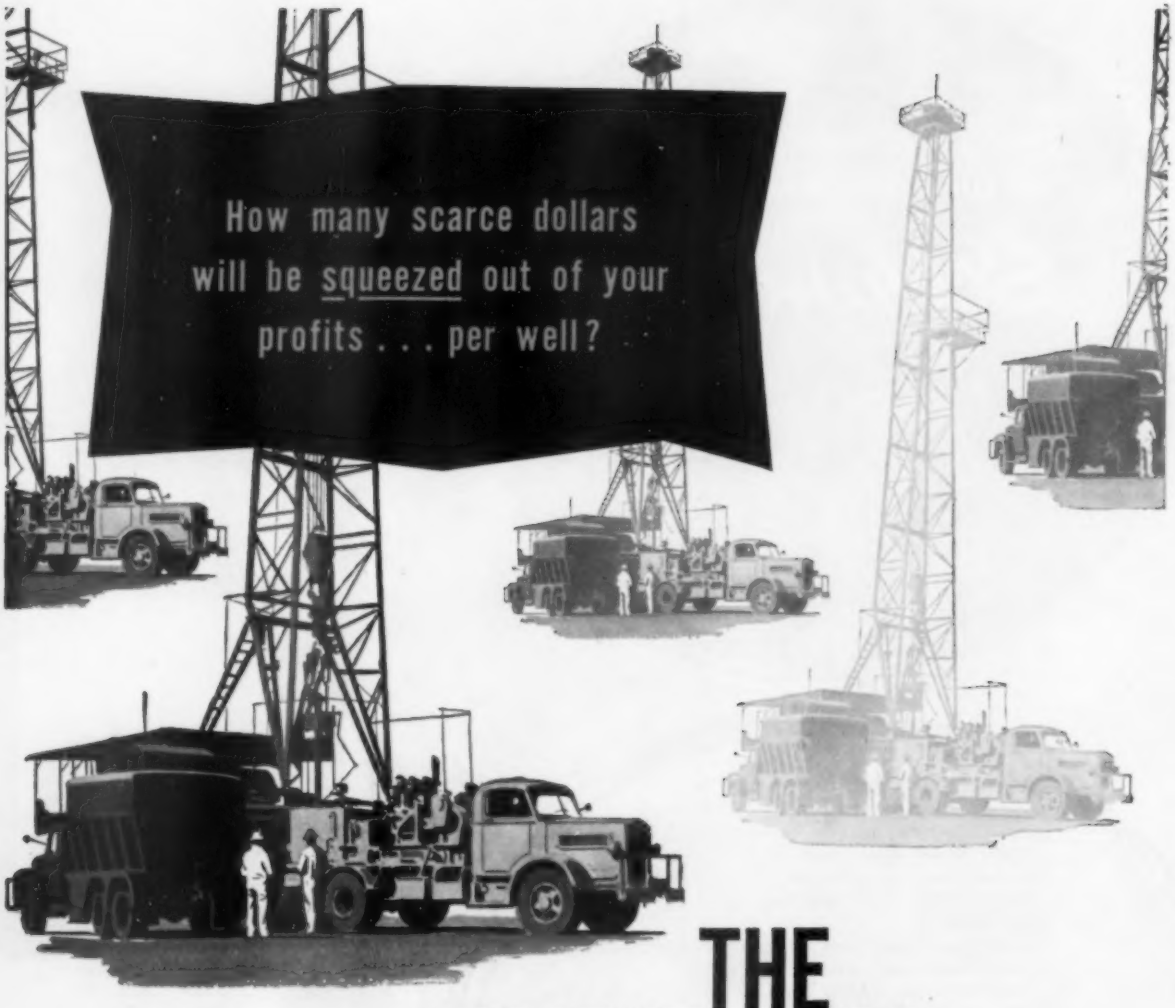
Time graph shows no flow through detector . . . thief zone above this point.



INSTRUMENT AT 9417'

Time graph shows slight flow through detector . . . thus, thief zone taking most of the fluid. Detector within one foot of thief zone.

SCHLUMBERGER . . . Engineering for Better Service



THE WEATHERFORD TECHNIQUE

Can Actually SAVE Dollars For You

The Weatherford Technique will give you a successful primary cement job—one that is free from the threat of remedial squeezing.

This fact is of great importance to today's operators—faced as they are with increasing costs and shrinking profits. Squeeze jobs, of course, are paid for out of profits. The costs, including loss of time and production, can never be recovered.

The Weatherford Technique eliminates the need for squeezing by assuring a successful cement job the first time. This Technique is being used successfully in hundreds of wells each month.

Well reports and case histories are retained at every field location. Your Weatherford representative will gladly make these available to you.

Talk to your nearest Weatherford representative, or write for literature.

WEATHERFORD
OIL TOOL CO., INC.

GENERAL OFFICES: 5920 Navigation Blvd., Houston, Texas

12-14 American Petroleum Institute, Division of Production, southwestern district meeting, Hotel Texas, Fort Worth.

17-21 International Atomic Exposition, Inc., 1958 Nuclear Congress, Chicago Amphitheatre, Chicago.

17-21 National Association of Corrosion Engineers, annual conference, civic auditorium, San Francisco.

20-21 New England Gas Association, annual meeting Hotel Statler, Boston.

20-21 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, regional conference on production and reservoir engineering, Mayo Hotel, Tulsa.

24-26 Midwest Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

24-26 Western Petroleum Refiners Association, annual meeting, Hilton Hotel, San Antonio, Tex.

27-29 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Southwest conference, St. Francis Hotel, San Francisco.

29 North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex.

31-April 2 American Petroleum Institute, Division of Transportation, annual pipeline conference, Jung Hotel, New Orleans.

APRIL

1-3 University of Oklahoma, fifth annual conference on corrosion control, Extension Study Center, Norman, Okla.

9-11 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Biltmore Hotel, Oklahoma City.

13-18 American Chemical Society, national meeting, San Francisco.

15-17 University of Oklahoma, thirty-fourth annual gas measurement short course, North Campus, Norman, Okla.

16-18 Natural Gasoline Association of America, annual convention, Baker and Adolphus Hotels, Dallas.

16-18 National Petroleum Association, fifty-fifth semiannual meeting, Hotel Cleveland, Cleveland.

17-18 Texas Technological College, fifth annual West Texas oil lifting short course, Lubbock, Tex.

17-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, Louisiana-Arkansas, East Texas, and Mississippi petroleum sections, gas technology symposium, Shreveport, La.

17-18 Geophysical Society of Tulsa, Tulsa Geological Society, annual midwestern exploration meeting, Tulsa.

17-19 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Northwest regional conference, Spokane, Wash.

20-23 American Institute of Chemical Engineers and Chemical Institute of Canada, chemical engineering division; Canada-U.S. chemical engineering conference, Montreal.

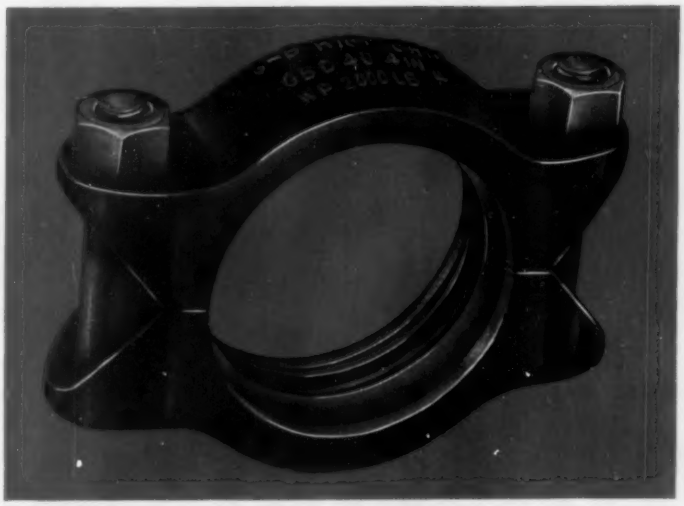
21-23 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Cosmopolitan Hotel, Denver.

23-25 Second International Williston Basin Symposium, sponsored by Saskatchewan Geological Society and North Dakota Geological Society, Regina.

27-30 American Association of Petroleum Geologists, Rocky Mountain section, Casper, Wyo.

RIGI-GRIP

For the RIGID coupling of grooved pipe



ANOTHER GUSTIN gb BACON FIRST

Now, wherever you want complete rigidity in a grooved pipe installation, you can get it! And you can get it in a tested-and-proved, rugged, easy-to-install coupling that gives you 2,000 lbs. working pressure. It's the All New Gustin-Bacon Rigi-Grip . . . a coupling that puts an end to "floating" lines, eliminates the need to spend time and money on bracing or other types of support.

Gustin-Bacon, FIRST to give you a dependable coupling for plain end pipe (the famous G-B Rolagrip), FIRST with a coupling for low working pressure grooved pipe (Gruvajoint).

And now another G-B FIRST, one that will be hailed wherever rigidity in grooved pipe is wanted! For instance: oil field tank batteries, oil well production headers, water flood pump house and field service lines, to name only a few of its many applications. Get all the details today! Ask at your nearest oil field supply store, or write directly to Gustin-Bacon.

Easy-to-install Rigi-Grips are available in 2, 2½, 3, 4 and 6-inch sizes. For lines carrying virtually any type of fluid or material, they are reclaimable, each coupling forming an easy-to-take-apart union.

GUSTIN-BACON Manufacturing Company

210 West Tenth Street, Kansas City, Missouri

HYCALOG

ANNOUNCING

"Qual" and "Quan" gas analysis... newest development in well logging. Another dividend you receive from Hycalog's continuing research program.

at no extra cost!

HYCALOG GAS CHRONOFRAC

Patent Pending

Now available in both Hycalog well logging units and gas recorders.

You get qualitative and quantitative analysis of gas samples . . . *at the well* . . . with HYCALOG GAS CHRONOFRAC analysis. The important gases . . . methane, ethane, propane, and butane . . . are immediately identified, measured, and recorded.

No comparable technique for field use has ever been developed except the SPECTRA-SCAN portable mass spectrometer . . . *also pioneered by* HYCALOG. And yet GAS CHRONOFRAC analysis costs no more than conventional field methods.

Write for free technical bulletin.

Hycalog, Inc.

505 AERO DRIVE
SHREVEPORT, LOUISIANA

DIAMOND CORING • DIAMOND BITS • WELL LOGGING • CORE ANALYSIS

28-29 University of Oklahoma, third annual conference on automatic control in the petroleum and chemical industries, Oklahoma Memorial Union Building, Norman, Okla.
28-29 Independent Petroleum Association of America, mid-year meeting, Sherman Hotel, Chicago.
28-30 Southern Gas Association, annual convention, Dallas.
29-May 1 Petroleum Industry Electrical Association, Petroleum Electric Supply Association, annual joint meeting, Adolphus Hotel, Dallas.

MAY

5-6 Society of Petroleum Engineers of A.I.M.E., North Texas section, secondary-recovery symposium, Wichita Falls, Tex.
5-7 Purdue University, thirteenth annual industrial waste conference, Purdue Memorial Union Building, Lafayette, Ind.
5-9 American Gas Association, distribution, production, and transmission conference, Roosevelt and Commodore Hotels, New York.
7-9 American Petroleum Institute, Division of Production, eastern district meeting, Deshler-Hilton Hotel, Columbus, Ohio.
8-9 Texas Petroleum Research Committee, eleventh oil recovery conference, symposium on "A Century of Texas Oil, 1875-1975," University of Texas, Austin.
11-14 Texas Independent Producers and Royalty Owners Association, annual membership meeting, San Antonio, Tex.
12-14 Chemical Insutute of Canada, National Research Council, eighth Canadian high polymer forum, Macdonald College, St. Anne de Bellevue, Quebec.
12-14 Instrument Society of America, symposium of analysis instrumentation division, Shamrock Hilton Hotel, Houston.
12-16 American Petroleum Institute, Division of Refining, midyear meeting, Statler Hotel, Los Angeles.
20-22 Pennsylvania Gas Association, annual meeting, Pocono Manor Inn, Pocono Manor, Pa.
21-23 American Petroleum Institute, Division of Marketing, midyear meeting, Roosevelt Hotel, New Orleans.
22-23 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.
26-28 Chemical Institute of Canada, annual conference and exhibition, Royal York Hotel, Toronto.

JUNE

8-11 American Petroleum Institute, Division of Transportation, annual tanker conference, Greenbrier Hotel, White Sulphur Springs, W. Va.
10-12 Appalachian Underground Corrosion Short Course, School of Mines, West Virginia University, Morgantown, W. Va.
19 Pennsylvania Grade Crude Oil Association, annual meeting, Penhills Club, Bradford, Pa.
23-25 Interstate Oil Compact Commission, midyear meeting, Hotel Utah, Salt Lake City.
22-28 American Society for Testing Materials, annual meeting and exhibit, Hotel Statler, Boston.
28-July 2 Petroleum Equipment Suppliers Association, twenty-third annual meeting, Chateau Frontenac, Quebec.

This valve is the Mission 2-inch figure 400 valve. See Mission catalog for complete listing of sizes and pressure ratings

New as tomorrow

MISSION'S LINE OF AUTOMATIC-LUBRICATED PLUG VALVES

HIGHER PERFORMANCE — LOWER COST! Just look at this cutaway of one of the new Mission Plug Valves. Here is advanced engineering that prevents valve troubles before they start.

Of course, this valve features the Mission split cylindrical plug with Automatic Lubrication and circular grease grooves around each port arranged so they are not washed by line fluid when the valve is operated.

When you combine all these features with the non-galling qualities of the Missionized plug halves, you get a basic valve mechanism that is as trouble-free as modern science can develop.

But that is not the whole story. Notice the Teflon combination thrust bearing and stem seal backed up by an "O"-Ring. This arrangement provides easy turning and positive sealing.

At the bottom, Mission uses a unique metal-to-metal seal that does not depend on studs or gaskets.

With minimum care, Mission valves last indefinitely. They are also compact to fit into complex manifolds, and they are low in overall cost. They are offered in nearly all sizes and pressure ratings for production, cycling, injection, and certain refinery applications. For more information, contact your supply store, your well head manufacturer, or your Mission representative. The quicker you standardize on Mission Valves, the lower your overall valve costs will be.

Nothing but the finest will bear the name of MISSION MANUFACTURING CO

MISSION MANUFACTURING CO. • P. O. Box 4209 • Houston, Texas • Cable Address—"Missco" • Export Office: 30 Rockefeller Plaza, New York
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SLUSH PUMP VALVES • PISTONS • LINER PACKING • LINERS • PISTON RODS • VALVE SPRINGS • GLAND PACKINGS • • SLIPS • SWABS • PLUG VALVES • CENTRIFUGAL PUMPS

Sikorsky S-58 pinpoints supplies at a jungle drill site. Earlier the rig itself was airlifted in sections to the site by helicopter. The S-58 will carry two tons of cargo in its Utility version.

Offshore oil operations also find Sikorsky helicopters best for airlifting quantities of men or cargo. In the Gulf of Mexico area alone, Sikorsky S-58s and S-55s are carrying more than 27,000 passengers monthly to and from rigs.

Why build roads?

Eliminating the need for costly road building, big Sikorsky helicopters have pioneered a new technique for oil drilling operations. With loads averaging about two tons, they flew directly from supply bases to drilling sites in the New Guinea jungle. They carried crews, sectionalized oil rigs, and all materials needed for construction and operation, Only a few months were required. An estimated 18 months would have been needed to do the job using ground transportation.

Sikorsky helicopters—and only Sikorskys—have proved their dependability in such actual heavy cargo operations in jungles and other primitive areas. If you have a problem involving moving men or materials to hard-to-reach places, write for information on how well Sikorsky helicopters can do the job.

SIKORSKY AIRCRAFT
STRATFORD, CONNECTICUT
One of the Divisions of United Aircraft Corporation

the OIL AND GAS JOURNAL

TULSA, OKLAHOMA

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Associated Business Papers

JOURNALLY SPEAKING

Auto Economics

IT BEATS ALL how seriously some people insist on taking this column.

For instance, some 6 months ago a vacation pinch hitter filled up this space for us by ruminating about how his high-school daughter wanted one of the shiny new 1958-model automobiles.

(Now don't anticipate. No, no fan sent in a new car. Nobody takes this column that seriously.)

He wound up by saying: "Some young engineer with a well-lubricated slide rule can do the public a service by research on how long a fellow should keep his car. It would make informative reading—we'll even write it up for the Journal."

That was a rash promise. For, sure enough, some young engineer did unlimber his slide rule and do that research. The report is signed Herbert L. Greaves, Jr., but we don't know who or where he is because his letterhead simply says "Standard Oil Co." (That must be Indiana Standard, which habitually takes for granted that everybody knows it is THE Standard Oil.)

His research resulted in two pages of tables, formulas, and engineer-type language about repetitive cycles continued ad infinitum, incremental operating expense, and "average as-is less repairs" values. We're going to renege on the promise to print it all, because we're positive that the figures wouldn't do you a bit of good in arguing your wife out of her desire for a new car.

Greaves' conclusion is that the most economical thing to do is to buy a used car 2 or 3 years old and drive it until it is 7 years old.

His example is a Ford or Chevy priced at $2,310 new. If you buy a new one of these every year you're investing $26,900 to keep driving the rest of your life (not counting the cost of gasoline and parking tickets).

How come? Well, as we understand his calculations, if you put $26,900 in the bank at 3½ per cent interest, you would always have enough income from it to buy a new one of these cars every year — a f t e r deducting trade-in value and adding an assumed figure for maintenance (a figure which makes no allowance for variations in the fender-crumpling propensity of owners' wives).

However (if we are picking the right figures out of Greaves' tables) you can keep yourself in automobile forever with a capital investment of only about $11,000 if you buy a car 2 or 3 years o'd and trade it in when it is 7 years old.

You only have to pay around $1,200, or less, for such a car. Your maintenance will run up around $200 a year toward the end, and your trade-in value will get down to $220. But just the same, according to Greaves' computations, this is the "optimum practice" from the standpoint of economic considerations.

Now, if your wife isn't satisfied with this line of reasoning, don't complain to us. We don't understand it either. Just search through the sundry offices of the various Standard Oil companies until you find this fellow Greaves, and collar him about it.

We rather suspect that Greaves concealed his location to keep from being jumped on by the automobile manufacturers who, we understand, have quite a few 1958 models they would be willing to part with.

And they ought to bat him down, too, because we think we detect a fallacy in his formula.

If everybody followed his advice and bought nothing but 2-year-old cars . . . well, how would new cars ever get to be 2 years old, and who would take the 7-year-old trade-ins, and what would happen to our whole economy?

This economics stuff is too deep for us. Maybe our economy depends on a lot of reckless spendthrifts who don't pay any attention to computations of optimum economic considerations.

Guess it would be simpler to ignore Greaves' data and let the wife get a new model like the people next door have, and forget all about such foolishness as having to have $26,900 in the bank at 3½ per cent interest.

—*Henry D. Ralph.*

Heard over a supply store counter...

"You mean it actually costs less to run casing with FLEXIFLOW?"

"That's right... because Flexiflow fills the casing automatically as it is being run, you save the time required to fill the casing at the surface. And what's more, you can run casing at a faster rate, without fear of damaging the formation with high-pressure surges. With Flexiflow, casing running times can be reduced by as much as one-third. That's why it costs much less overall to run casing with Flexiflow."

Flexiflow's Flexible Flow-Control Diaphragm *automatically* adjusts itself to compensate for increases in pressure—automatically relieves harmful pressure surges before they can act on the formation. The higher the pressure from below, the more the hole through the diaphragm expands. And after the first few joints of casing have been run, the hole expands to the point where a joint is filled as each new joint is run. This, of course, is the condition that provides maximum relief from pressure surges (Ram effect). After each joint is run, the hole returns to its original diameter, controlling the fill and preventing overfill of the casing.

Another very important fact about the pressure-relief provided by Flexiflow, is that, in addition to minimizing the danger of breaking down a potential lost circulation zone and setting up a possible bad cement job, the chances are very good that you are at the same time *protecting the producing life of the well.* Pressure surges, created by the use of conventional floating equipment under certain conditions, drive a portion of the well fluid into the formation and tend to "mud-off" the producing zone. This can seriously cut down the production of a well. By using Flexiflow to relieve these pressure surges you are actually protecting the producing formation.

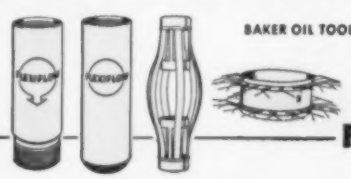
Baker Flexiflow Fill-Up Shoes *(Product No. 160)* and Collars *(Product No. 161)* provide all of these protective features and, in addition, contain the time-tested ball-type back-pressure valve for cementing.

Available now at your supply store, Flexiflow Equipment may be obtained in either conventional form or with the added feature of Baker exclusive Whirler Ports *(Product Nos. 162 and 166)*. Uniform distribution of the cement as it is pumped from the shoe or collar can be as important as having the casing centered in the hole. These whirler ports provide added assurance of getting that uniform distribution, since the cement is forced around and around the casing as it leaves the shoe, minimizing the possibility of channeling.

Baker Fill-Up Equipment, conventional or whirler, used in proper combination with Baker Casing Centralizers and Baker Wall Scratchers, provides you with maximum assurance of successful primary cementing.

Available now at your supply store!

Baker Flexiflow Fill-Up Collars and Shoes
Baker Casing Centralizers
Baker Wall Scratchers



BAKER OIL TOOLS, INC., HOUSTON · LOS ANGELES · NEW YORK

BAKER FLEXIFLOW

Debate on imports: More law needed now?

THE sudden decision of the IPAA to seek mandatory controls on oil imports took many in the industry by surprise.

It has precipitated a hot debate over whether to give the administration's voluntary program further trial or push for a law with teeth.

CHIEF ARGUMENTS FOR immediate legislation are:

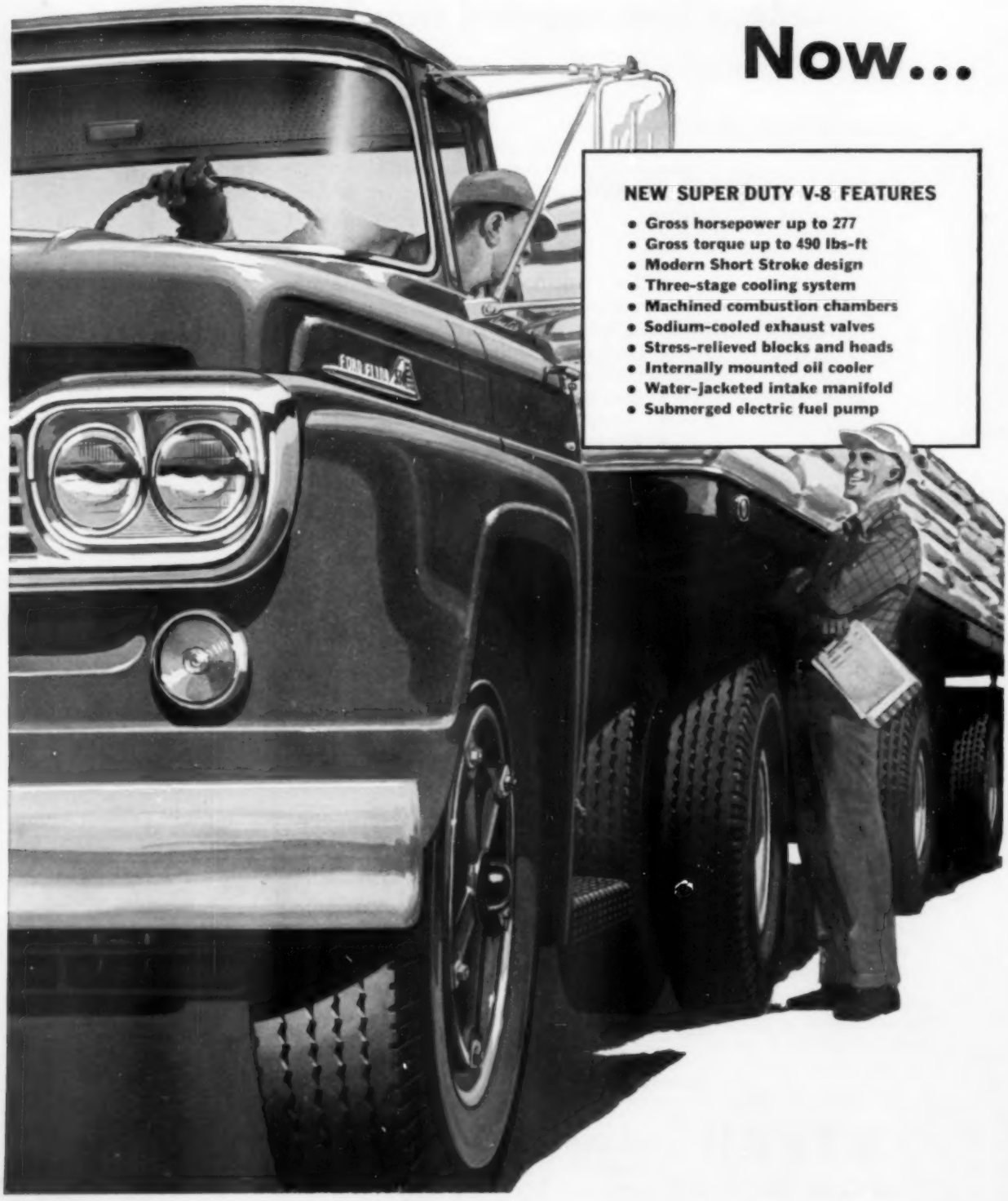
- The voluntary program threatens to break down. Two or three importers appear to be thumbing their noses at it. Many new applicants are demanding quotas which inevitably will boost the over-all level.
- Domestic production and exploration are in worse shape than before the program started.
- Demand has proved to be so poor that imports should be cut more than was thought necessary last summer.
- The Reciprocal Trade Act is before Congress for extension, possibly for as long as 5 years. So this may be the only practical opportunity to get congressional action for a long time. The voluntary program is so precarious that a more specific law should be written now.

ON THE OTHER HAND, arguments against precipitate action include:

- As of now the voluntary program has virtually achieved its objectives. Imports during its first 6 months were 3.3 per cent above the goal, but this could be corrected in the next 6 months.
- All the older (and bigger) importers are complying fully, and so are most of the so-called new importers. The two or three mavericks who are way above quota or are importing without any allocation might yet be brought into line by public and private pressure.
- None of the two-score recent applicants has indicated refusal to accept an allocation lower than requested.
- Imports aren't the sole cause of domestic producers' troubles. There is irrational emotionalism over an alleged "flood" of foreign oil.
- The unexpectedly low demand can't be blamed on imports. Within 6 or 8 months demand should begin to pick up, both here and world-wide.
- A law further reducing total imports couldn't be effective for months, so wouldn't help domestic producers now.
- The administration is pledged to protect the domestic industry against excessive imports. It has promised that if the voluntary program fails, some form of mandatory controls will be imposed.
- Instead of demanding federal regulation by law and specifying an inflexible, punitive formula, the industry might be smarter, in the long run, to let the administration work out the details of how it is going to keep its promise.

Big new FORD

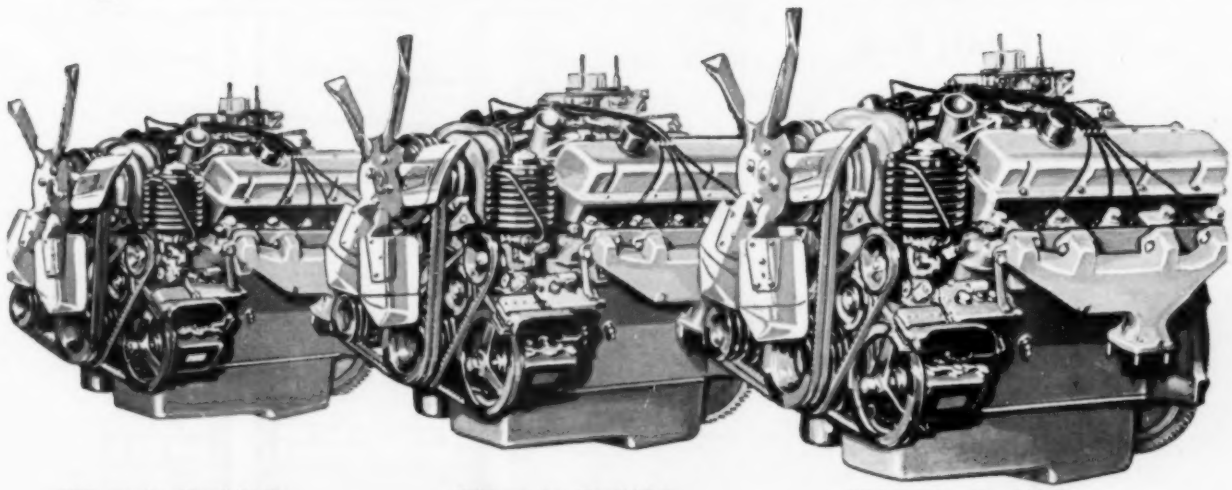
Now...



NEW SUPER DUTY V-8 FEATURES

- Gross horsepower up to 277
- Gross torque up to 490 lbs-ft
- Modern Short Stroke design
- Three-stage cooling system
- Machined combustion chambers
- Sodium-cooled exhaust valves
- Stress-relieved blocks and heads
- Internally mounted oil cooler
- Water-jacketed intake manifold
- Submerged electric fuel pump

super duty V-8's up to 534 cu. inches!



401-cu. in. Ford V-8
Maximum horsepower—226.
Torque: 350 lbs-ft @ 1800 to 2300 rpm.

477-cu. in. Ford V-8
Maximum horsepower—260.
Torque: 430 lbs-ft @ 1800 to 2300 rpm.

534-cu. in. Ford V-8
Maximum horsepower—277.
Torque: 490 lbs-ft @ 1800 to 2300 rpm.

10 BIG NEW EXTRA-HEAVY TRUCK SERIES

GVW's up to 51,000 lb. For '58, ten new basic series are added to Ford's already extensive Heavy and Extra Heavy Duty line. Four new Tilt Cabs, four new Conventionals, and two new Tandem models offer GVW ratings up to 51,000 lb.

GCW's up to 75,000 lb. New T-950 Tandem is rated for 75,000-lb. GCW. Biggest single-rear-axle models are rated for 65,000-lb. GCW.

Front-axle capacities up to 15,000 lb. Choice of three front axles in most new Ford Extra Heavies. Rated capacities of 9,000, 11,000 and 15,000 lb.

Rear-axle capacities up to 29,000 lb. Wide choice of rear axles includes single-speed and two-speed, single reduction and double reduction types. Capacities range from 18,000 lb. to 29,000 lb.

Bogie-axle capacities up to 38,000 lb. For '58 there are *five* Ford basic tandem axle models. Biggest of the *five* is the brand-new T-950 which features a tandem rear-axle assembly rated for 38,000 lb. Other bogie-axle capacities range down to 22,000 lb. for Ford Series T-700.

New transmissions. Roadranger transmission available in all ten new Ford Heavies. Up to 33% less shifting. Engines operate in peak horsepower range, use less fuel. "Short Fourth" transmissions also available on "F" and "C" Series.

FORD TRUCKS COST LESS

LESS TO OWN... LESS TO RUN... LAST LONGER, TOO!

Better Protection

with 'INCOR' Sulphate Resistant Cement

...Less Cost, Too

● First used nearly thirty years ago in the East Texas field, then rapidly spreading throughout the Panhandle fields, Central and West Texas and other areas, 'INCOR' 24-Hour Cement reduced the cost of "waiting on cement," saving lost rig time and delayed production.

Always-dependable 'Incor' performance has resulted in steady year-after-year increases in the use of America's first high early strength or so-called 'quick-set' cement.

And now 'INCOR' SULPHATE RESISTANT CEMENT—'A DUAL PURPOSE OIL WELL CEMENT' is in steadily widening demand. It provides protection against sulphate attack where needed.

In addition, and of more significant importance in some areas, is the greater yield of slurry per sack of cement—lower cost per cubic foot of slurry back of the casing—lighter slurries that assure better circulation with added protection and dependable high early strength at all times.

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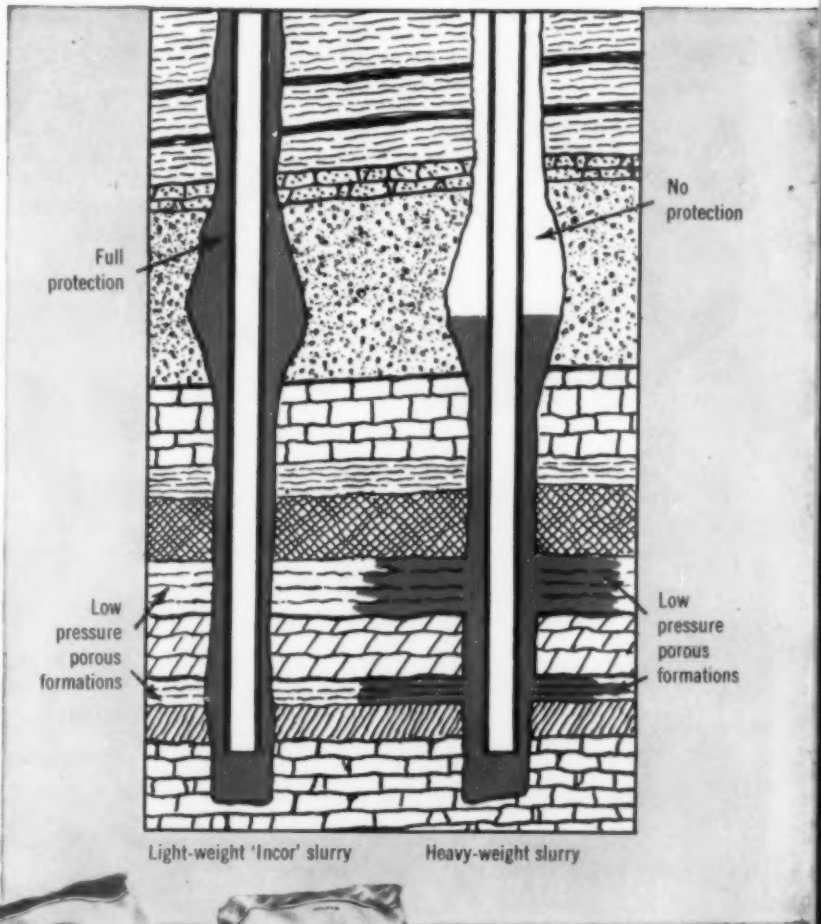

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Tariff, Lower Price Could Help Canada

With the U.S. limiting imports and foreign crude filling Canada's own markets, Canadian producers are in a bind. They must either wait for growth in demand or take drastic steps to solve their own problems, a noted consultant concludes.

CANADA has no easy way out of its crude-oil dilemma. Development of production has far outstripped the growth of its markets.

But the situation isn't impossible; there are things which can be done about it, in the opinion of Dr. Walter J. Levy, internationally known oil consultant. Levy has just completed a study of Canada's markets for 14 Canadian independents.

The basic problem, says Levy, is that Canadian oil is at a disadvantage of 25 cents a barrel in competition with foreign oil for the eastern seaboard market.

What can be done about it? Levy offers these suggestions:

... **Cut the wellhead price** of crude by 10 cents a barrel. Producers wouldn't suffer if the cut were accompanied by additional production of 200,000 bbl. per day.

... **Reduce pipeline charges,** particularly for the long haul to Montreal.

... **Impose an import duty** of 10 cents per barrel. A 10-cent tariff now imposed by the U. S. on foreign crude tends to keep the f.o.b. price low for Canada, which has no tariff.

A policy ... Levy is the first to admit that even these three suggestions may not provide the market Canadian oil must have. Something else may be needed: A public policy that supports Canadian markets for Canadian crude.

If, for example, Canada wants to establish a market for its crude at Montreal, it must do more than merely make prices competitive. Refinery operators at Montreal also have large holdings in Venezuela and the Middle East, and the incentive is great for them to continue using their overseas supplies.

Levy does not recommend exactly what Canada should do about this phase of the problem, but he does make a pointed reference to the method by which the U. S. has met the same issue.

"The United States, whose practice in this regard may or may not recommend itself to Canadians, has acted to protect its domestic markets for domestic crude oil production by setting individual 'quotas' for importing companies and calling upon them voluntarily to comply," Levy says.

Thus Levy implies, without recommending, that one solution for Canada is import control.

He goes a step further by pointing

Here's the man who made the study ...

WALTER J. LEVY is a long-time consultant and government adviser on international oil economics. His company is W. J. Levy, Inc., New York.

Educated in German universities, the 47-year-old expert has served a number of governments and foreign oil companies. He edited the Petroleum Press Bureau, London, from 1937 to 1941.

During World War II he was a civilian oil consultant to the U. S. Office of Strategic Services and to the Joint Chiefs of Staff.

He has served on a number of State Department delegations to foreign nations and was petroleum adviser to the U. S. delegation to the council of foreign ministers in December 1947. In 1951 he accompanied Averell Harriman to Iran as an adviser to the Presidential mission on the Iranian oil problem.

In 1950 he advised the Venezuelan Government on settlement of its royalty problem.

The 14 Canadian independent oil companies which hired the Levy firm to make the study of Canada's crude market potential are Canadian Devonian Petroleums, Canadian Homestead Oils, Canpet Exploration, Charter Oil Co., Colorado Oil & Gas, Consolidated East Crest Oil Co., Consolidated Mic Mac Oils, Home Oil Co., Medallion Petroleums, Merrill Petroleums, Okalta Oils, Pacific Petroleums, Westburne Oil Co., and Western Decalta Petroleum.

out also that Canada currently is suffering from a large deficit in foreign trade—and crude imports are a major contributor to the imbalance. Of the $734 million deficit in 1956, crude imports accounted for $271 million.

The way to help balance the scales of foreign trade, Levy said, is to expand Western Canada's export market or reduce the volume of foreign crudes entering eastern Canada.

The outlook . . . Levy pulls no punches in describing Canada's plight.

Development of production in recent years has exceeded the growth in demand within the market area to the extent that the producing industry now operates at about 50 per cent of capacity.

"Drilling activity has slowed down, and the incentives for future resource development are threatened," Levy says.

While hope for market expansion lies in refinery expansion in Canada and the northern U. S., recent developments do not make such a prospect encouraging. Business retarded in 1957, and the outlook for 1958 is no better.

Also the U. S. import policy has dimmed the prospect for selling more crude to refineries in Washington, Wisconsin, and Minnesota.

Canada, therefore, may not be able to profit greatly by expansion of refineries until "the early sixties" and, in the meantime, may have to face "further years of greatly restricted output."

The West Coast . . . Levy believes that the U. S. West Coast, a deficit oil area, should be a natural market for Canadian crude. Moreover, western Canada crude can be competitive with Venezuelan and Eastern Hemisphere crude as far south as San Francisco.

If Trans Mountain pipeline cut its rates and expanded throughput, Levy believes Canadian oil could have a cost advantage on the West Coast despite low tanker rates for overseas supplies.

However, price is not the big issue in this area that it is in Eastern Canada. Here, again, Canada runs up against the economic fact that West Coast refiners are affiliated with integrated companies owning vast reserves in foreign countries.

"In these overseas areas, reserves are established and replacement costs low," Levy says. "Owned-production, or even long-term purchase arrangements, mean greater over-all profits."

In contrast to this, Canadian crude must be taken ratably from all producers. A producer-refiner cannot take only his own production.

"Thus, given a choice among foreign crude sources, these companies will probably continue to prefer other foreign supplies to Canadian oil," Levy says.

Not even in the nearby Puget Sound area is the Canadian position secure. The reason: New oil discoveries in Alaska and the State of Washington. If these discoveries prove substantial, the resulting production would tend to replace Canadian supplies.

The Midwest . . . The price is important to Canadian crude when it competes for the U. S. midwestern market.

To reach major refining centers, Canadian crude faces extra transport charges and the U. S. duty. The competitive disadvantage ranges upward from 10 cents per barrel.

Two other factors cut into Canadian prospects in this area. First, the U. S. import policy stifles market expansion, and, second, the Midwest companies recently have gone into overseas exploration. As these companies develop foreign production, the incentive will be great to bring it to the U. S. in preference to Canadian crude.

The import policy of the U. S. will have another detrimental effect on Canadian crude which hopes to find a midwestern market. With the limitation of total imports, the market for imports will be concentrated on the East and West coasts, while the U. S. domestic crude will be pressed increasingly on the interior market.

Eastern Canada . . . As for the Montreal market, Levy says Canada might even do well to delay seeking such an outlet because of the "logistics"—the long haul.

However, he attaches a big "if" to this suggestion. Canada should hold off only if the export market to the U. S. develops sufficiently to guarantee a satisfactory outlet for western Canada oil.

Failing this, the Canadian producing industry "might have to seek relief where its own national policies could prove effective."

"This would, in fact, mean a penetration of the Montreal market," Levy concludes.

New Mexicans Want Pipelines

. . . for unconnected wells. Southeastern area may suffer from competition of Four-Corners crude; lawsuit studied.

NEW MEXICO, like Texas, may become the scene of a new legal battle to force pipeline companies to serve unconnected oil wells.

Jack Campbell, attorney for the Independent Producers and Royalty Owners Association of New Mexico, said his organization is preparing a coordinated legal campaign to settle the issue. The association wants "all economically feasible wells" tied in with pipelines.

Campbell, who also is an influential member of the New Mexico legislature, said the first step will be to obtain from all members of the association detailed information on unconnected wells and trucking charges now being paid.

Campbell estimated there are between 600 and 800 unconnected wells in southeastern New Mexico alone, compared with about 500 a year ago.

"The situation is becoming steadily worse," Campbell said. "It promises to become still more critical with the completion of the Texas-New Mexico pipeline, which will collect crude in Utah and northwestern New Mexico and dump it on the market at Jal," Campbell said.

"Once we determine the full extent of our problem we will determine what legal steps can be taken. Presumably, the action would be initiated in the Oil Conservation Commission through the common-purchasers agreement in the state statutes."

Campbell said the legal question to be resolved is whether pipeline companies can be required under New Mexico law to extend gathering lines to wells "and how far they can be required to extend them."

Pipelines are not classified among the "common carriers" in New Mexico's constitution—a fact which Campbell said complicates the legal issue.

New Mexico independents fear completion of the Texas-New Mexico pipeline will put unconnected operators in a hopeless competitive situation.

"Some of them have to pay up to 25 cents a barrel trucking fees to have oil moved as much as 5 or 6 miles," Campbell said. "When the new line is finished and begins dumping nonprorated Utah oil into the southeastern New Mexico and West Texas market, the situation may get very black indeed."

Import Problems Continue to Grow

• New importers threaten voluntary program with quota requests. Cabinet committee will meet soon to review developments. Older importers assured they won't be penalized for reduced buying. Delta agrees to file for quota.

THE FILING of three more requests for quotas last week added to the growing problems of the voluntary crude import control program.

Notices of plans to import were filed by the Danahoe Refining Co., Houston; Martin Oil Service, Inc., Blue Island, Ill.; and Ingram Oil & Refining Co., New Orleans.

They brought the total of pending quota demands to 21. All told, these add up to well over 200,000 bbl. a day. All of the companies planning to import are newcomers in the field.

There were these other developments in the import situation:

... **The cabinet committee** assured importers that they could cut back their entries without fear of quota cuts later.

Revision of the import program will be considered soon by the committee.

... **Capt. M. V. Carson, Jr.,** program administrator, reportedly is considering asking American Independent Oil Co. and its owners whether they are willing to revise the contract which Eastern States Petroleum Co. says prevents it from cutting its imports.

... **The State Department** made an informal reply to Canada's protest against its inclusion in the West Coast import program.

Carson has scheduled two series of hearings next week and the week following to hear all 21 requests for quotas.

The total new imports asked, plus the unauthorized entry of 20,000 bbl. daily by Delta Refining Co., would, if granted, raise the recommended level for foreign crude nearly one-third above the 771,400 bbl. daily programed in the four-district control plan.

Some observers see in this situation a threat to the whole government effort to keep imports down. They look for action rigorously tightening up the control program.

More controls ... Domestic producers already are planning to seek new provisions in the Reciprocal Trade Act to deal with the situation. They would take the "voluntary" out of the program, and substitute official controls.

Administration officials are opposed to any such changes. They take the position that the import program must be kept flexible, so it can quickly be changed to meet any change in conditions. To that end, they believe a voluntary program is the best approach.

The big fear is that Congress, if it writes controls into law, might phrase them in such a way as to tie the government's hands or make quick action impossible.

The assurance that importers may cut their entries without fear of reprisal came in the form of a statement that Commerce Sec. Sinclair Weeks, chairman of the cabinet committee, authorized Carson to make.

Any revision of the import programs will be based on approved individual company allocations, not on actual imports, Carson said.

The committee met 10 days ago to review the situation. It talked about both revision of the programs and mandatory controls but took no action on either, it was reported.

The committee recommended no changes in the programs but will review the situation "shortly," it was disclosed.

"The committee wishes at this time to assure the importing companies that they need not import the full amounts which they are now allowed under the program solely to protect their positions in the event that a revision is recommended in the future," the official statement said.

Carson said: "This assurance should relieve the companies of any compulsion to import more crude than they need."

Eastern States' case ... Carson, who has been corresponding with Superior Oil Co. about its sale to Delta Refining Co., also is reported to be considering a request to American Independent to review its position on the Eastern States contract.

Eastern States has a quota of 18,300 bbl. daily. Its December import was 24,700 bbl. a day and its average for the first 5 months of this year is expected to be 26,700 bbl.

The company has assured Carson of its desire to comply with its quota. But it says it is tied up by a contract with American Independent which it has been unable to get revised.

Eastern States' claims that its supplier has refused to make any adjustment. Carson is said to be studying the possibility of testing this by going directly to American Independent and its owners.

Superior's deal ... Carson has received a long letter from Superior Oil Co., explaining its views on the contract under which Delta last month brought in a 200,000 bbl. shipment of Venezuela crude without a quota.

Superior also is to sell crude to Ingram Oil & Refining, one of the three latest applicants for quotas, it is reported, and is talking deals with other refiners.

Superior reportedly is offering Venezuelan oil at 70 cents per bbl. under posted price, with Superior to pay part of the import tax. The company also offers to pay part of any new tax or tariff which may be levied, it is said.

Carson disclosed that Delta Refining agreed to file for a quota. Its request will be considered with the 21 others to be heard beginning next week.

Agreement came after an exchange of letters and a personal talk with E. J. Constantin, Jr., principal owner of Delta.

Carson also had asked that the company suspend further imports pending acting on its quota request. He did not disclose whether Constantin agreed to do so.

Canadian protest ... The State Department, meanwhile, disclosed that an oral reply was made to Canada's protest note filed last month. Canada objected to cutting Canadian oil imports under the new West Coast program.

No decision has been reached about making a written response, it was said.

A department spokesman explained that the protest actually was nothing more than a formal statement of the Canadian Government's views that had previously been presented orally.

These views, the official said, were considered in detail before announcing that Canadian oil would be included under the West Coast program.

Oil Rides Out Venezuelan Upheaval

New military junta is dominated by conservatives favorable to oil. Crisis for the industry is expected to come, however, when politicians take over.

ONE AMAZING fact stands out boldly from the smoke of battle in Venezuela: The oil industry escaped with practically no bruises.

Oil's physical plant and its standing in eyes of the Venezuelan public appear safe—at least for the moment—and the outlook for future investment and expansion still is good.

This is the over-all picture:

Oil management and workers were not embroiled in the fighting or political maneuvering.

Oil's contacts and standard with the new regime are excellent.

Oil's old policy of political tightrope walking and generous benefits to its Venezuelan employes paid off handsomely.

The more conservative, pro-business, and intelligent forces of Venezuela presently are in the saddle. They have the strength to ride out the current crisis. If the future holds any trouble, it will come when and if leftist forces attempt to gain supremacy.

But it's too early to draw any definite conclusions on the future political climate for oil.

Politicians returning to the country are looking for issues to whip their followers into action. Oil increasingly is becoming their favorite target, especially since Venezuelan production is feeling the pinch of U. S. restrictions on imports.

How oil fared . . . American executives who had a chance to travel by air over the country even during the revolution report the upheaval affected oil production only slightly.

A general strike early in the revolt reportedly cut production at Creole's Amuay refinery and at Shell's Cordon plant. But supervisory personnel took charge and quickly returned runs to normal.

Only one incident in the fields has come to light so far. Saboteurs loosened wellhead connections at one well of Atlantic Refining. The producer flowed wild for a short time until workers restored the connection.

Otherwise, production, pipelining, and refining operations continued at a near-normal rate.

In Caracas, center of most of the bloody fighting, oil-company headquarters experienced no troubles. Workers went about their routine business, annoyed only by the 5 p.m. curfew and lack of taxi service. Food and room services in the city's hotels were not curtailed.

The political outlook . . . The oil industry in Venezuela has a new political boss as a result of the change in governments.

He is Dr. Jose Lorenzo Prado, new minister of mines and hydrocarbons.

The 56-year-old Dr. Lorenzo Prado was born in San Fernando, State of Apure. He attended the Caracas Lyceum and obtained a bachelor's degree before obtaining his professional degree in chemistry from Central University in Caracas.

An analytical chemist, Dr. Lorenzo Prado was professor of mineralogy and hydrology at Central University before becoming subdirector and later director of the National Laboratory in 1940. When the national laboratory was absorbed in the ministry of mines and hydrocarbons, he became director of chemical investigations within the ministry.

Oil men stress one fact about the stability of the ministry. The former minister, Edmundo Luongo Cabello, did not flee. He even was present at the swearing in ceremony for his successor.

Luongo Cabello, reportedly was not in bad graces of the new junta. He was removed only because the new rulers felt he would be associated with the Perez Jimenez regime in the eyes of the public.

Oil men also put much stress on the attitude toward foreign investments of Rear Admiral Wolfgang Larrazabal, who heads the military junta now in power.

Larrazabal told the American press in Venezuela that a favorable economic climate for present and future investments will be maintained. This will represent no departure from the Perez Jimenez rule which generally held a pro-business attitude.

Members of the cabinet operating under the junta also are respected Venezuelan businessmen, lawyers, and industrialists. They all realize the importance to Venezuela of the multimillion dollar investments poured into their country by American oil companies.

How did oil escape? . . . This is a big question which nearly every oil man operating in Venezuela is asking himself.

There was a time during the explosive revolution when it appeared the oil industry might be dragged into the controversy. Adherents of Perez Jimenez, seeing their days numbered, reportedly tried to spread rumors that foreign oil money was behind the revolution. The rumors apparently failed to take hold. Oil never became a political issue.

Most American oil men have one answer to the industry's success in staying out of the trouble. They say at least in Venezuela the oil industry has done a good job of public relations and has proved itself a good citizen.

Old hands in Venezuela long have avoided any semblance of playing local politics. They pretty well have stuck to their knitting. In addition they have maintained a policy of good wages, good housing, and other benefits to nationals in their employ.

The established companies also have told oil's story to the country well. They have supported good causes while growing into such an important part of the nation's economic life.

What about oil's plans? . . . The industry's plans for expansion will be somewhat curtailed in Venezuela this year, but this situation has no connection with politics.

Budgets of companies in the country have been cut due to the general world petroleum conditions. The imports-control plan in the United States and a generally soft world crude market are restricting the market for Venezuelan crude.

New companies just entering the country with new concessions, however, still will continue exploratory work to prove up their holdings.

In addition, the long-term outlook for Venezuelan oil still is as bright as that in the United States. Oil men there are banking on an eventual upturn in world business.

The political struggle . . . What brought on the revolution?

The people in Venezuela were just fed up with the police state being operated in the last days of his rule by Perez Jimenez.

Oil men say the people finally exploded against increasing arrests by security police, imprisonment without trial, and grisly tortures by the Venezuelan-style gestapo.

That explains why the security police and even national police were the objects of mob wrath.

Leader of the revolt was a young Caracas newspaper reporter, Fabricio Ojeda, who headed the Patriotic Junta, a coalition of the four major political parties in Venezuela.

The Patriots were joined by elements of the Navy, Air Force, and National Guard to sweep Perez Jimenez out and form the present military junta which is holding interim power.

Larrazabal, who heads the ruling junta, has brought in business and professional leaders to head cabinet posts and plans within a matter of months to hold elections and transfer the government to democratic political elements.

Oil men fear the next crisis could come at that time. They point out the Army which supported Perez Jimenez is not conspicuous in the present junta. They think if elements too radical gain power in the political husting the Army may attempt a coup.

Political attitude . . . Reassuring statements have come from prominent members of the present junta.

Eugenio Mendoza, an industrialist and one of two civilian members of the five-man junta, joined Larrazabal in promising safety to foreign investments.

Mendoza said the junta plans to continue development projects started by Jimenez, including the petrochemical complex now under construction at Moron.

But what the leaders of the country's political parties will do is another matter.

Jovito Villalba, exiled leader of the middle-of-the-road Democratic Republic Union Party, was the first of Venezuela's ousted political leaders to dare a return to the country.

His remarks at the Caracas airport last week had an ominous sound. He said his country had a great many things to "settle with the United States."

Villalba said he does not favor nationalization of Venezuela's oil, but he does favor the formation of mixed companies in which Venezuela would have an interest. He said more refining should be done in Venezuela and that oil pipelines should be common carriers instead of under individual or joint company ownership as they are now. He added that Venezuela's standard royalty formula probably needs further study.

Villalba's party presently is the strongest in the country. But that's because exiled leaders of the even more leftist Democratic Action Party have not yet returned. The Democratic Action potentially is Venezuela's strongest party.

Retaliation? . . . Oil executives in Caracas are showing growing concern that U. S. oil import restrictions may become a political issue in Venezuela.

Now that Perez Jimenez suppressions have been lifted more and more Venezuelan business men and politicians are speaking up. They express resentment at the curbs on the market for their oil in the U. S.

Some talk openly of retaliation.

This talk mentions possible restrictions on Venezuelan purchase of U. S. goods and changing the nation's oil laws to give the government more control over U. S. companies operating in the country.

Some show deep resentment which if unchecked could upset the public's good opinion of the oil industry.

MR. GUS II drilling a tight hole in 137 ft. of water. Does it mean a . . .

New Discovery in the Gulf?

A LOUISIANA offshore wildcat, located in the deepest water yet drilled in the Gulf of Mexico, has led to speculation of a major discovery.

Drilled as a tight hole, the well has been undergoing tests the past few days.

The wildcat is in a record 137 ft. of water. It is the CATC Group's No. 1 in Block 70, West Delta area, about 25 miles off the coast of Louisiana. The well is being drilled by C. G. Glasscock Drilling Co. from its giant mobile platform, Mr. Gus II.

The gulf's previous water depth record of 118 ft. was set by a rig on a permanent platform more than 30 miles offshore in the South Timbalier area.

Nearest production to the new West Delta record holder is 5 to 6 miles to the northwest in Block 43 of the Grand Isle area.

Tight holes have been a rarity in open waters of the Gulf of Mexico, where leases are bought in large blocks at public auctions.

The rumored discovery is near the eastern edge of a large block of CATC leases covering approximately 90,000 acres. Submerged lands to the south and east of the rumored discovery are unleased.

Government officials have indicated the next sale of leases in the federal-controlled regions of the outer Continental Shelf will not be held until next fiscal year. Industry officials predict another sale likely will be postponed until next fall or later—perhaps much later.

Continental Oil Co., operator for the CATC Group, says the tight hole was bottomed at 13,495 ft. Scout reports indicate pipe has been set at about 11,000 ft.

How Retirement Plans Are Working

Five-company study shows retired oil men have two chief problems: Money and learning to loaf gracefully after years of hard work. Most are happy, busy people, with definite ideas on how to improve company programs.

MANY OIL MEN who've retired have no money worries, but they find loafing galling. Others sometimes find their style of loafing cramped by lack of money.

The same problems may plague oil men still active. But their retired colleagues have found their happiness depends on solving both. The solutions generally come from careful economic planning before retirement and from keeping good health.

These are only some of the conclusions from a new study of the adjustment problems faced by oil-company annuitants. John Self, Carter Oil Co. accountant, made the research as part of his master's degree in psychology at the University of Tulsa.

Self in his research questioned several hundred annuitants of Carter, Shell Oil Co., Sunray Mid-Continent Oil Co., Gulf Oil Corp., and Service Pipe Line Co.

It's one of the few such studies of the oil industry, and Self's research throws light on a little-known subject.

Oil companies through the years have spent huge sums on retirement programs. Management has spent many hours devising plans, then trying to make them mesh with personal savings and social security to assure workers a comfortable retirement.

The pension problem is a growing one too. Experts in the field say the United States in 1965 will have nearly 17 million persons 65 years of age and over. Only 22 per cent of them will be working. The trend in the last few years has been an increase in the number of persons older than 65 and a steady decline in the number who still work past this age.

What about the pension plans offered by the oil companies? Are they adequate? How do the annuitants feel about them? What do these workers think about their former employers?

Answers to these questions would provide a guide to management evaluation of pension programs in general. The information also could be valuable for workers making plans years in advance of retirement.

The Money Worry

Financial security is one of the most important factors for happiness during retirement.

This is the view of one-fourth of all the annuitants surveyed by Self.

The researcher discovered that 71 per cent of the annuitants undertook no gainful employment at all. Of the 29 per cent who hold full or part-time jobs, 19 per cent work because they need money.

One paradox developed: a surprising 77 per cent found they are getting along as well retired as before. This apparently means the pensioners feel they are able to meet their major needs because 66 per cent report they are not living quite so well now as before retirement.

Self thinks this apparent discrepancy has some explanations. A majority complained they were not saving any money. Self said, after all, there may not be any reason for pensioners to save. They have guaranteed income, so why try?

Some annuitants apparently feel the lowered income which retirement brought represented something of a pinch. But the facts are, most have had to give up nothing important in retirement. Of the 46 per cent who are forced to sacrifice, 13 per cent said they now wear less expensive clothing, 11 per cent have given up

REALLY LIVING is the way R. B. Roark describes his retirement from Shell Oil Co. Roark is a former Shell vice president in charge of operations and spent 30 years in geology, production, and drilling. He's learned to loaf by hunting, fishing, caring for his rose garden. "I'm happy," he says.

POLITICS is the new career of James A. Arnold, former Sunray Mid-Continent Oil Co. employe, who now is Tulsa County assessor. After spending 35 years in the oil business, Arnold enjoys life teaching Sunday school, taking care of his real-estate interests, and serving in a political office.

FISHING and boating on Oklahoma's lakes keep Orville Knox busy and fit. He retired 2 years ago after 38 years with Carter and Standard Oil Co. (N. J.), mostly in oil production. Knox says a man must help himself. He must plan for retirement, then the adjustment isn't so great.

The investigator . . . And what he found out from annuitants

JOHN F. SELF, accountant for Carter Oil Co., also is a psychologist. As part of his work for a master's degree at the University of Tulsa, Self delved into the adjustment problems confronting annuitants of five oil companies. It's the first such study and provides interesting information for oil management as well as workers facing the customary retirement at 65.

1. PLANNING for retirement is very helpful, but, strangely, not essential in every case. Best plan: Get expert counseling from someone trained in the retirement field.

2. FINANCIAL SECURITY and keeping busy are the two main ingredients of happiness in retirement.

3. ADEQUATE INCOME depends upon: Saving and investing prior to retirement, paying off the mortgage on the family home, and maybe holding a part-time job.

4. COST OF LIVING rises have pinched annuitants who retired some years ago. Companies should tie annuities closer to the cost of living and Government should abolish $1,200 limit on yearly earnings of annuitant.

5. MOST FARE WELL on reduced income. Most say they're not living so well, but their needs also have dropped some.

6. OIL COMPANIES ARE LIKED by most of their annuitants. Average pensioner worked 29 years for the company and many preferred not to retire.

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vacations, and 10 per cent now eat less expensive food.

And to top this, 69 per cent feel their present income gives them permanent security.

Means of support . . . The chief sources of income for oil-company pensioners took a combination of forms.

A combination of social security and pension provides 20 per cent with bulk of their income. Social security by itself provides chief revenue for 11 per cent. Investments or savings give another 11 per cent their chief support.

None of the annuitants receives support from his children.

The annuitants who either by necessity or choice work after retirement from their oil-company jobs have one common complaint: The ridiculously low limit of $1,200 set on annual income by the Social Security Administration.

This throws a greater burden on the annuitant. If his job furnishes more than $1,200 a year income, he is denied social security payments.

NEW JOB was the answer for Ralph L. Banister, who 4 years ago retired after 35 years with Gulf Oil Corp. Banister said he got tired of bending nails around the house after 6 months. He now is new-business manager for a firm that contracts for janitorial and maintenance services.

LEGAL RESEARCH has occupied the time of James A. Veasey for 19 years since he retired as legal counsel of Carter Oil Co. Veasey has traveled to every oil county in the United States for his study of the legal evolution of the oil lease and has unearthed material that may prove invaluable.

GOLFING, fishing and traveling occupy the time of F. P. O'Connor, who retired 2½ years ago after 35 years with Service Pipe Line Co. For a long time he was superintendent of communications and electrical equipment for the pipeline. His advice to pensioners: "Stay put, don't run away."

KEEP BUSY is the key to retirement happiness for Edward H. Menger, former accounting supervisor for Carter who spent 39 years in the oil business. He keeps busy by traveling over the United States, gardening, working around the house, and doing executive jobs for the Boy Scouts.

ART OF LOAFING is being learned by Bruce Byfield, retired Sunray Mid-Continent refinery foreman who had spent 39 years with his company and its predecessors. He says retirement is a personal problem, different for everyone. The big adjustment: Leaving the routine of work and not being able to see the men you worked with.

Several annuitants said they could work 8 months or less out of the year and protect their social security rights. They feel the social security limit should be raised to a respectable figure or abolished.

A home owner . . . A big majority of oil company pensioners (74 per cent) own their own homes, and only 16 per cent are still paying off mortgages.

Many reported that owning a home free of heavy mortgage payments was a big factor in their ability to fare well on the smaller retirement income.

Other interesting facts about pensioners' living arrangements: Vast majority (82 per cent) still live with their spouses. Only 8 per cent live with children, and 10 per cent live alone. For most, these arrangements were by choice.

Social Adjustments

A majority of the oil-company annuitants would rather have stayed on their jobs than retire. Most of them retired because their companies retire all employes at a specific age.

Yet a few, 15 per cent, quit work so they could have more time to themselves. Only 6 per cent retired because they felt their health was poor.

Among retired workers, the question at what age people should be pensioned is quite controversial. Self's survey shows that retirement at 65 is only one of many possible answers.

At least one-fourth of annuitants questioned feel retirement should be set as early as 60. More favor discretionary retirement from 65 to 69. A few think 55 should be the age, and about the same number are on the other end of the scale, favoring age 70

How they feel . . . At any rate their new-found freedom apparently has brought the pensioners happiness.

Most are content and had no difficulty in adjusting to retirement. Only a few reported lacking anything to do. Others keep busy with a variety of activities.

Keeping busy apparently is one important key to retired happiness.

A former refinery foreman said he misses the routine of going to work every day and misses seeing the people with whom he had worked for so many years. Otherwise there was no great adjustment for him in retirement.

Another former administrator in the same company is busier than ever. He still teaches a Sunday school class, looks after his real estate interests, and has gone into politics.

Other former oil men have avidly taken up gardening, golfing, fishing, traveling, and just old-fashioned loafing to fill their days.

Friends are often a problem. A majority of the annuitants declared they have fewer close friends now than before retirement. They also see friends less often but still enjoy visiting people with whom they formerly worked.

When all is said, 58 per cent of those surveyed like the idea of being retired, 26 per cent dislike the idea, and 16 per cent professed no feeling on the matter.

What About Planning?

There's no pat formula for successful retirement. But Self's survey revealed one overriding opinion: Planning well in advance for retirement is best.

This planning should be accompanied by expert counseling, which apparently is badly needed among oil companies. The minority of pensioners who did receive prior counseling reported the discussions helpful. They recommended that more of this be done and that the job be performed by someone trained or experienced in the work.

As for planning, the oil-company annuitants made these points on:

. . . Finances. They should be put in order many years before retirement. Voluntary savings programs, stock-purchase plans, or savings-bonds programs which are offered by many oil companies help provide a sound base for adequate retirement income. These may be supplemented by personal insurance or investment programs.

. . . Place to live. Most annuitants agree that a retirement home in Florida or California often is not the best idea. A majority prefer to live out the later years right in the place where they have spent their working years. If this is the case, a home free of mortgage is a big asset.

One pensioner gave his philosophy on a place to live like this: "We can rent a cabin on the lake, a place on the beach, or in the mountains, stay there for awhile and when we get tired come back home where our friends are. There's no reason for us to pull up stakes and move to Florida and California where we don't know anyone."

. . . Hobbies. They aren't absolutely

Carter Has Some Friendly Watchdogs

THE "SENIOR BOARD" of Carter Oil Co. convenes every Friday noon at the Alvin-Plaza Hotel in Tulsa.

Its four permanent members always arrive early to grab off a private table before the noon rush in the busy hotel dining room. Sometimes a few visitors join the group. Then the talk flies, and the oil men linger long over their coffee cups.

They can take their time. None has to rush back to the office because they all are retired Carter employes who hold the weekly luncheon just to keep in touch with friends, talk over old times, or as one annuitant puts it, "run the business of Carter Oil Co." The practice points up one adjustment pensioners must make: Getting used to not being a part of the company any more.

The four reliables seated above are W. N. Winters, P. F. Michael, Frank Salthouse, and George E. Edgett. They are talking to Journal District Editor W. A. Bachman, standing.

necessary to happiness in retirement, but most annuitants usually find they adopt a hobby to keep busy.

The hobby may be one of the more popular ones, such as fishing, golfing, gardening, woodworking, traveling, or puttering around the house, or it may take the form of doing some research into a field of interest, a part-time job, some public-service work, or even a new career.

At any rate, pensioners say that some advanced planning should go into the retirement problems of finances, a place to live, and what you're going to do, even though some find happiness without doing so.

Some Suggestions

The Self survey produced a scattering of suggestions from pensioners for improving company retirement programs.

Self, however, found that 31 per cent of the annuitants are satisfied generally with their companies' programs. Another 15 per cent think pensions should be readjusted to coincide with the cost of living, and 25 per cent think the programs should be more comprehensive.

Other suggestions generally touched on these two main points:

... **The $1,200 limit** on pensioners' earnings fixed by Social Security Act should be changed.

... **More counseling** by companies early enough that the worker is able to have expert advice on finances and living adjustments which must be made on retirement.

Self's research confirmed one widely made claim of oil companies: Their workers enjoy long company service and they like their companies.

Self found the over-all average length of service for oil-company pensioners was 29 years. Annuitants of every company surveyed gave exceedingly high-level appraisals of their companies. Most also said if they had their working career to start over they probably would work again in the oil industry.

More Alberta Gas

signed up for line proposed from Canada to California.

ALBERTA & SOUTHERN Gas Co., Ltd., has signed up more than enough gas to deliver the 450,000 M.c.f daily proposed for its 1,300-mile line from Alberta to San Francisco.

J. K. Horton, president of Alberta & Southern, an affiliate of Pacific Gas & Electric Co., announced contracts with California Standard Co. and British American Oil Co., Ltd., in Dick Lake field; Bailey Selburn Oil & Gas, Ltd., and Texaco Exploration Co. in Pine Coulee field; Texaco Exploration and McColl-Frontenac Oil Co., Ltd., in Homeglen-Rimbey field; Alida Oil Co., Ltd., in Minnehik-Buck Lake field; Tennessee Gas Transmission Co. in Crossfield pool; and Texaco Exploration in Castle River field.

These contracts cover firm deliveries totaling about 175,000 M.c.f. daily. Earlier Shell Oil Co. committed 200,000 M.c.f. daily and Pembina producers signed contracts for unspecified volumes with Alberta & Southern. In addition the company has options giving first call on another 450,000 M.c.f. daily as it is developed.

Options are with Mobil Oil of Canada, Ltd., in Virginia Hills and Alhambra; Canadian Fina Oils, Ltd., Hudson's Bay Oil & Gas, Ltd., and Pan American Petroleum Corp., in Whitecourt; California Standard, west of the fifth meridian and between the Athabasca River and a line west from Macleod to the British Columbia border; and Imperial Oil, Ltd., between the British Columbia border and the fifth meridian and south from the Athabasca River to the U. S. border.

Alberta & Southern has applied for an export permit from the provincial conservation board.

Shell Cuts California Output

SHELL OIL CO. has joined the growing list of California operators who are cutting back production in the face of mounting stocks.

Shell plans to shut in 5,000 bbl. daily. It also plans to make "certain adjustments" in the volume it buys.

In addition, Shell plans to ship California crude to its Anacortes, Wash., refinery to replace some of the Canadian crude it has been importing, according to S. F. Bowlby, vice president.

EL DORADO'S 20,000-bbl. refinery is part of the deal in . . .

Big Expansion for Petrofina

ANOTHER BIG BATCH of oil properties will swell the assets of American Petrofina, Inc., to well over $100 million when the company takes over all major oil and gas holdings of Atlas Corp., probably in March.

An agreement between the two companies last week was the third big expansion move in less than 18 months for the fast-moving U. S. affiliate of the giant Belgian firm.

Besides a big increase in reserves and refining capacity, the new acquisition will push Petrofina's total retail marketing outlets to 1,300. This month the company will start marketing gasoline under the well-known brand name of "Fina" for the first time in the U. S.

From Atlas, Petrofina will acquire all assets of the wholly owned Atlas subsidiary, Petro-Atlas Corp., Tulsa, and its subsidiary El Dorado Refining Co., El Dorado, Kans. These include:

. . . **Daily production** of 3,000 bbl. of oil and reserves of 11,000,000 bbl. This will increase Petrofina's daily production to 10,000 bbl. and reserves to 40,000,000 bbl.

. . . **Gas reserves** of 125 billion cubic feet, with daily production of 10,000 M.c.f. This will give Petrofina total gas reserves of 300 billion cubic feet and total daily production of 35,000 M.c.f.

. . . **A 20,000-bbl. refinery** at El Dorado to supplement Petrofina's 20,000-bbl. plant at Mount Pleasant, Tex., and a 10,000-bbl. refinery at Wichita Falls.

. . . **About 500 retail** marketing outlets, to tie in with the 800 which the company already has. In addition, Petrofina will build an average of six new $31,500 service stations each month.

The price involved in the deal was not disclosed, but the value of Petro-Atlas assets was set at $25 million in the parent company's 1956 report. Payment to Atlas will be partly in cash, partly in common stocks of Petrofina, and partly in new Petrofina convertible debentures.

The agreement was announced jointly by Harry A. Jackson, president of American Petrofina, and Floyd B. Odlum, Atlas president. Odlum said Atlas will continue to be active in the producing end of the oil business. He said Dale R. Snow, head of Petro-Atlas, will remain with the Atlas organization.

Rapid expansion . . . American Petrofina was set up in 1956 as a subsidiary of Cie. Financiere Belge des Petroles, S.A., based in Brussels. In its first step at becoming a fully integrated U. S. company, Petrofina bought control of Panhandle Oil Corp. in September 1956. This included production, marketing outlets, and the Wichita Falls refinery.

Early in 1957, the company acquired American Liberty Oil Co. This included more production and reserves, the Mount Pleasant refinery, 165 miles of pipeline, 400 retail outlets, and the marketing brand name "Amlico."

The marketing of "Fina" and "Fina Supreme" gasoline this month will be the first use of those names in the U. S., although the brand name is used in other parts of the world. Both brands will have a one to two point better octane rating than previous American Petrofina brands.

Petrofina is still in an expansion mood, and other deals are pending. The company is looking for more oil properties, refining capacity, and marketing outlets as part of a long-range building program.

Kenai Area Opened

for leasing. Land includes acreage near production.

THE INTERIOR DEPARTMENT last week split the 3,200-sq.-mile Kenai Moose Range between the oil industry and Alaskan wildlife.

Secretary Fred A. Seaton announced that 1,525 sq. miles of the big reserve will shortly be opened for oil and gas leasing. But oil operations will be banned on another 1,689 sq. miles, where wildlife and fish are to be protected.

Seaton said that the leasing will have to be cleared with the House merchant-marine committee. But there is no indication of opposition from that group, which is in charge of wildlife legislation.

The lands to be opened lie chiefly north of the Sterling Highway. They include the area now producing, and two proposed new unit areas. Also included in the opened lands will be the Swanson River Valley, the Soldonata area, and lands around the towns of Kenai and Kasilof.

The Alaskan lands will be the first to be opened to leasing under new regulations signed by Seaton last month. The rules, which ban leasing of wildlife refuges except to protect against drainage, will be the subject of an investigation which Sen. Joseph C. O'Mahoney of Wyoming hopes to get under way soon.

Seaton explained why Alaska was considered first. Production has been found recently, he said. Also the Alaskan authorities asked for quick action because of the need for new oil supplies for the people of the territory and the military. The Defense Department also sought quick opening of the area, he disclosed.

Kenai Test Near Target

RICHFIELD OIL CORP. has cemented 7-in. casing to 11,650 ft. in 2 Swanson River Unit on Alaska's Kenai Peninsula. It was drilling ahead below 11,900 ft. last week.

The test is about 2 miles south of 1

Swanson River Unit, Richfield's discovery well, which found nonmarine Eocene pay at 11,150-11,215 ft.

On the Alaska Peninsula, about 280 miles southwest of Kenai Peninsula, Humble Oil & Refining Co. has recovered a fish and last week was drilling ahead below 6,570 ft. on 1 Bear Creek Unit in the Widebay-Kanatak area. Humble plans to go to 12,000 ft. in this wildcat.

The third major drilling project under way in Alaska is Colorado Oil & Gas Corp.'s wildcat 1-A Well in the Tongass National Forest near Yakutat Bay on the mainland. This is about 380 miles southeast of Richfield's Kenai activity. This test, like the second Kenai effort, is nearing its programed depth of 11,500 ft. Colorado had just recovered a fish and was drilling ahead below 10,656 ft.

Alberta Demand Up

for February despite lower bids from U. S. refiners.

CRUDE PRODUCTION in Alberta will edge upward again in February despite another cutback in demand by U. S. refiners.

February nominations total 367,499 bbl. daily. This is 22,972 bbl. per day more than the January demand, and about 68,500 bbl. higher than in December.

Behind the increase is the greater seasonal demand in Canada. Refiners in Saskatchewan, Manitoba, British Columbia, and Ontario are all asking for more crude than they took in January. Ontario alone is asking for 121,950 bbl. daily during the month.

But western U. S. refiners are taking only 40,536 bbl. daily, as compared with 50,886 bbl. daily in January, and 56,886 bbl. in December, the month that the U. S. Government announced an imports control program for the West Coast.

Shell Oil Co. sliced its requirements for its Anacortes, Wash., refinery from 21,000 bbl. daily in January to only 10,000 bbl. in February. Nominations from other U. S. refiners are as follows:

General Petroleum Corp., Ferndale, Wash., 23,600 bbl. daily; International Refineries, Inc., Wrenshall, Minn., 8,036 bbl.; Texaco Exploration Co., for General Petroleum's Ferndale refinery, 6,711 bbl.; Lake Superior Refining Co., Superior, Wis., 5,357 bbl.; Bay Refining Corp., Bay City, Mich., 4,300 bbl.; Dow Chemical Co., Midland, Mich., 357 bbl.; West Branch Refineries, Inc., West Branch, Mich., 357 bbl.; and Union Oil Co., Cut Bank, Mont., 225 bbl.

watching WASHINGTON

. . . with Bertram F. Linz

• Congress warming up for fight

CONGRESS will get into the first big fight of the new session when it takes up extension of the Reciprocal Trade Act this month.

Domestic industries are seen as ganging up to force formal import controls into the law. The oil and coal states delegations will lead the fight. They will be joined by congressmen from industrial areas where manufacturers have been hurt by imports.

If the administration doesn't go along, some say, the bill can be defeated.

Administration officials express confidence that Congress will not kill the measure. But some frankly admit that the President's call for a 5-year extension and more power to cut tariffs has little chance.

The outlook now, at best, is for a 1-year extension with no tariff cutting. And some sort of deal will have to be worked out on import control.

Meanwhile, new bills are being worked out to be offered if the trade act is killed. At least one would not leave any power with the President. Control of tariffs would be returned to Congress. The old log-rolling system might be revived, as a result. But some feel that would be better than the present system.

• Offshore "bonanza" fizzles

BILLS IN CONGRESS would use the Government's revenue from oil and gas on the outer Continental Shelf to aid education.

If that's all education is to get out of the U. S. Treasury it will be in a bad way. Interior Secretary Fred A. Seaton disclosed last week that rents and royalties from the outer shelf in fiscal 1957 were only $2,208,700.

Against the $2 million the outer shelf brought in last fiscal year, mineral leasing on the uplands returned $81 million.

The department got its big money from the sale of leases in 1954 and 1955. It collected around $250 million. It hasn't sold any leases since July 1955. And it isn't likely to sell any this year, with the gulf states' boundaries still in dispute.

Most of the known best prospects on the shelf were leased in the three sales held after Congress passed the 1953 tidelands bill. It isn't likely that future sales will bring the high bonuses then offered.

The department will get more money this fiscal year than last from operations on the shelf. A lot of it will come from the gas that is now being sold. But the big water is a long way from being a bonanza.

• Bloom is off the tanker boom

THE TANKER-BUILDING PROGRAM, boomed by the closing of the Suez Canal in 1956, is slowing down.

Several contracts for new oil ships have been canceled in the past few months. More cancellations will come.

This is what has happened: Only three new tankers were delivered by U. S. shipyards in fiscal 1956. In the following 12 months 16 were built. In the last 6 months of 1957 a total of 15 new or converted tankers slid off the ways.

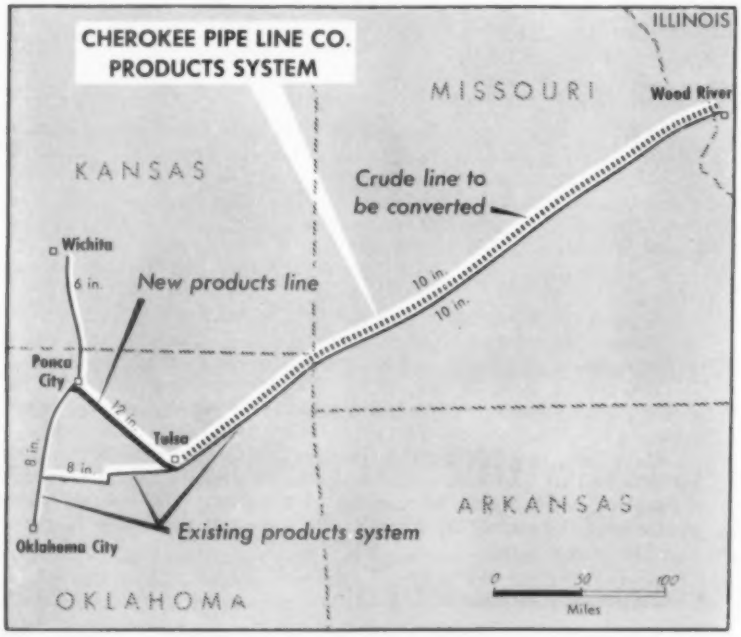
At the start of this year 31 tankers were building. Another 69 were on the shipyards' books. But after September the only order received was for one tanker conversion. And 11 ships previously ordered were canceled.

The 34 tankers delivered since July 1, 1955, raised the tonnage but not the size of the U. S. fleet. Actually in that period, 36 were either traded in and placed in reserve or traded out and transferred to foreign flags.

At the start of this year there were 327 vessels in the private fleet and 48 in the government reserve.

Cherokee to Double Capacity

. . . of products system by converting Tulsa-to-Wood River crude line and constructing new 12-incher in Oklahoma.



CHEROKEE Pipe Line Co. will start this month on a major expansion of its products system from Oklahoma to Wood River, Ill.

There are two phases to the $5½-million expansion:

. . . **Construction** of a new 78-mile, 12-in. line from the Ponca City, Okla., refineries of Cherokee's parent companies, Continental Oil Co. and Cities Service Oil Co., to the Glenn Pool terminal near Tulsa. Connections will be made to the D-X Sunray Oil Co. and The Texas Co. refineries at Tulsa.

. . . **Conversion** of its second 400-mile, 10-in. line from Glenn Pool to Wood River from crude to products service. The switch will give Cherokee a dual 10-in. products system between the two points. Three new stations will be built and three others expanded on this line.

Pipeline Service Co., Seminole, Okla., is the apparent low bidder for the new construction, due to get under way later this month.

The combination of new construction and conversion of crude facilities was the best answer for Cherokee's transportation requirements: It was in need of increased products capacity from Oklahoma but had no particular need of the crude capacity of the old Wood River line.

New capacity . . . With the originating station at Ponca City, the Ponca City-Glenn Pool-Wood River system will have initial capacity of about 60,000 bbl. per day.

An expansion to 80,000 or 90,000 bbl. per day is possible by building a booster station between Ponca City and Glenn Pool and by adding stations on the Wood River lines, which will be operated as a single system. Cherokee will have double its present capacity when the program is completed sometime this summer.

The new 12-in. line will reduce the need for the 8-in. line which extends eastward from the Ponca City-Oklahoma City line to Glenn Pool.

Background of system . . . The two 10-in. lines which make up a major part of the Cherokee system were built in 1930 and 1931 by Ajax Pipe Line Corp., a Standard Oil Co. (N. J.). affiliate. They provided a new outlet north and east for flush Mid-Continent discoveries.

In 1932 Oklahoma Pipe Line Co., now Interstate Oil Pipe Line Co., subsidiary of Standard of New Jersey, assumed management of Ajax. In 1954 Interstate sold its Oklahoma properties and Ajax Pipe Line to Cherokee Pipe Line, which converted part of the system to products service.

Crude lines serving declining old fields were no longer needed. Postwar modernization brought replacement of multiple small-diameter lines with larger trunk lines, and the smaller lines could be operated more economically as products carriers.

Big Role in Atoms

played by the oil industry. Seven of 31 atomic research labs owned by oil firms.

THE OIL INDUSTRY is still taking a leading part in the peacetime uses of the atom.

A roundup of developments last year, compiled by the Atomic Industrial Forum, shows oil's prominence in the use of isotopes, operation of radiation research centers, and even the mining and refining of uranium.

A total of 74 oil, petrochemical, and allied companies are now using radioactive isotopes. Last year, nine new firms joined the growing list. While more individual companies were listed in the metal-working, paper and chemical industries, the greatest diversification in isotope application remains in oil, it is believed.

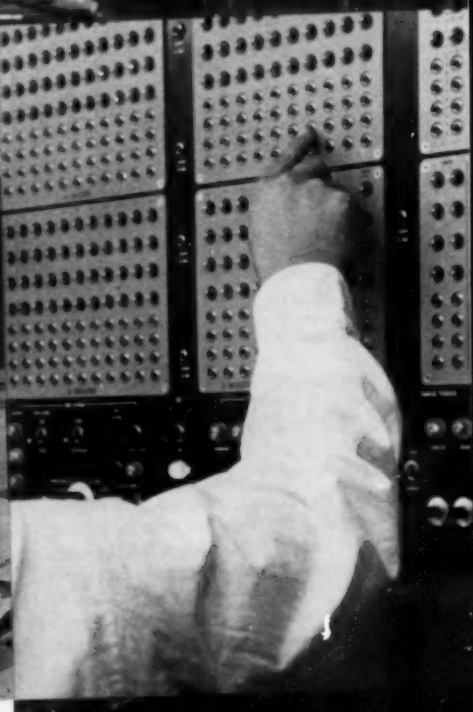
In all industry, the largest number of companies using isotopes employed them for thickness and other gaging. Radiographic inspection and radiation effects ranked next in the order of number of companies involved. Oil companies are heavy users of isotopes for these applications, plus the widespread employment in wear studies, activation analysis, leak detection, and studies of catalysts and catalytic reactions.

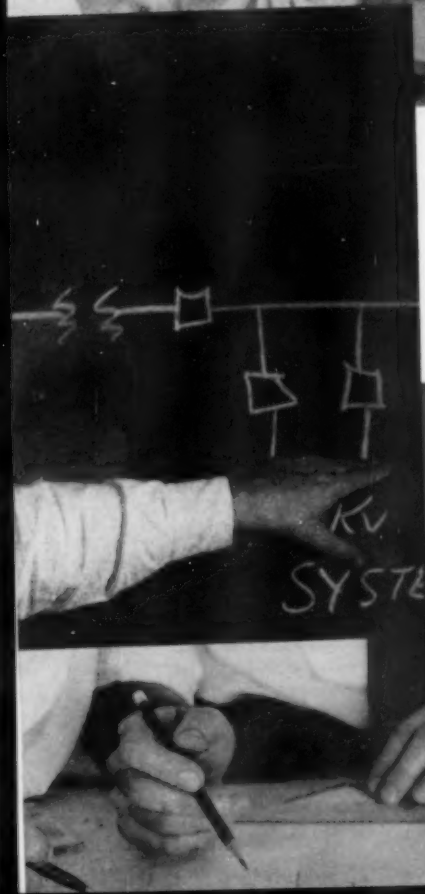
Among those companies operating radiation research centers, the oil industry is again prominent.

Prior to 1957, there were 17 companies operating radiation research centers. Four of the 17 were oil companies, Continental Oil Co., Esso Research & Engineering Co., Sinclair Refining Co., and Socony Mobil Oil Co. Last year, three more oil companies, Cities Service Co., Gulf Oil Corp., and The Texas Co., joined the list. This gives oil 7 out of 31 companies which operate radiation research centers.

The oil industry has a hand in uranium mining and refining, as well. Out of 24 facilities with a milling capacity of 20,420 tons of uranium ore per day, 4 are owned wholly or partly by oil companies, whose capacity is 7,300 tons per day. In fact, the largest mill in the nation is the 3,300-ton Grants, N. M., mill of Kermac Nuclear Fuels Corp., owned by Kerr-McGee Oil Industries, Inc.

Fluor's Datatron digital computer frees engineers from routine computation, permitting full use of their creative design talents. Its ability to quickly perform intricate calculations without error shortens engineering lead time . . . assures maximum precision and efficiency in completed plants.





WHEN you consider expansion...
the most important investment
you can make in
the creative ability of men.

FLUOR

The Fluor Corporation, Ltd.
Engineers & Constructors
2500 S. Atlantic Blvd., Los Angeles

WASTE WATER is treated biologically in cooling towers in foreground; impurities are removed in settling basin in background. The system has worked well for Sun, and now . . .

Sun, Fluor Offer New Process

FOR THE PAST 3 YEARS Sun Oil Co. has been treating waste water, and reusing it. A prime feature of the method is the use of biological oxidation in the cooling-tower system.

Now the method is being made available to the industry at large through Fluor Corp., Ltd. Under an agreement with Sun, Fluor will provide consulting, engineering, and related design and construction services in adapting old waste-water systems or in building new ones.

Sun points to three major advantages of the methods it developed at its Toledo refinery

. . . **Treatment** is economical.

. . . **Much of the water** is recovered for reuse in the refinery.

. . . **Maintenance** of a large impounding basin assures a constant source of water for plant fire protection.

Refinery waste waters are segregated at the source. Process water containing sulfides is charged to a flue-gas stripping tower. Together with low-alkalinity process waste waters and contaminated storm water from ground runoff, this treated stream passes to the API separator for primary removal of oil and settleable solids.

The API separator empties directly into an 8,000,000-gal. impounding basin which provides storage, equalizing, further removal of residual free oil and settleable solids, and preliminary biological oxidation. This basin receives the main quantity of refinery waste waters.

Oil-free water of high alkalinity bypasses this system and goes directly to refinery effluent. Another system handles cooling tower blowdown and crude-desalting wash water in a separate API high-solids separator for oil removal before discharge.

The payoff comes in reuse of the water from the impounding basin. Following gravity separation and impounding for 4 to 6 days, substantially all of this low-alkalinity process and storm water is withdrawn as makeup to refinery cooling towers without further treatment.

Since nearly 80 per cent of cooling tower water is lost in evaporation to the atmosphere, this reuse factor allows a severe cut in total water demand.

It cuts costs . . . According to Sun engineers, this system has cut their total water bill as much as 50 per cent.

At the same time, the continual presence of large water volume in the impounding basin gave them all the water they would need for fire-fighting.

The final plus in Sun's system is the use of the cooling towers themselves for bacterial oxidation. Cooling tower environment is particularly suited to this operation.

Correct temperature, plenty of surface, and abundant oxygen supplied by induction fans give a higher efficiency and reliability than are available in conventional biological waste-treatment equipment, says Sun. On the other hand, no damage to the towers themselves results from the presence of a wide variety of biological life.

Bacterial action has reduced phenol in waste water from 500 to 0.5 lb. per day. Sulfides and mercaptans are virtually eliminated. Less biochemical oxygen, important to aquatic life downstream from a refinery, is required in the cooling tower. Finally, the oil content of the waste water leaving the refinery has been lowered to less than 1 bbl. per day.

Seaboard May Sell

out to Texas Co. in proposed stock-exchange transaction.

THE TEXAS CO. may take over Seaboard Oil Co.

Seaboard President R. S. McFarland said Texaco plans to propose that Seaboard stockholders receive one share of Texaco stock for each share of Seaboard stock.

Texaco has held about one-third of Seaboard's stock since 1933 and currently buys about two-thirds of Seaboard's domestic crude production of 37,000 bbl. per day.

Value of the two-thirds not held by Texaco is approximately $145 million.

McFarland said the stock exchange plan has the approval of several large stockholders and the Seaboard directors. He added it may be necessary for Texaco to register its shares with the Securities and Exchange Commission. The deal is contingent on certain investigations by Texaco and on other conditions.

Seaboard is solely an oil producer, McFarland said, and its operations would complement those of Texaco, an integrated company. Texaco's daily production is 433,000 bbl.

Automation Deal Made

BLACK, SIVALLS & BRYSON, Inc., has been licensed by Shell Development Co. to build and market Shell's oil field lease automation systems.

Shell development, a subsidiary of Shell Oil Co., has agree also to give BS&B technical information acquired on the automation systems.

Both companies have been active in oil well lease automation for several years. Shell patents cover automatic

control of well production, well testing of individual well production, and custody transfer of production to the pipeline.

Pooling of technological information by the two companies should produce savings in field operating costs and greater accuracy in measuring the saleable product, officials of the firms said.

Pipeline Expansion

approved by FPC for Gulf Interstate's gas system.

GULF INTERSTATE GAS CO. has won temporary authorization to spend $51 million to expand its pipeline capacity by 91 million cubic feet daily from Louisiana to the West Virginia border.

Gulf Interstate plans to build 351.7 miles of 30-in. main-line loops and 54 miles of 24-in. lateral-line loops to give it a maximum winter delivery capacity of 666,100,000 cu. ft. daily.

The company said its present capacity of 575,000,000 cu. ft. daily will be inadequate in November to supply the needs of its sole customer, United Fuel Gas Co., Charleston, W. Va. United Fuel is a subsidiary of Columbia Gas System, Inc.

FPC approved the expansion plan with the stipulation that Gulf Interstate get FPC approval of its financing plan. The temporary certificate did not authorize operation of the facilities. This will be ruled on later.

The expansion is the second for Gulf Interstate in less than a year. Last April the company received FPC approval to add 69,000 hp. to its system by building the industry's largest single installation of engine-driven centrifugal compressors. Work on the project has been completed.

NPC Ruling Due Soon

Future course of the National Petroleum Council may be decided within the next 10 days.

Chairman Walter S. Hallanan and other NPC members met 10 days ago with top Justice Department officials. Atty. Gen. William P. Rogers was unable to attend the meeting but was expected to have a conference with Hallanan soon.

Interior Sec. Fred A. Seaton, who raised doubts about the council's operation with an oil man as chairman, said last week there are still some points to be ironed out. But a final decision should be made shortly, he said.

Processing briefs

A 100,000-bbl. LPG underground storage cavern is being excavated in solid granite beneath the Marcus Hook refinery of Sun Oil Co.

Mining is being done from a central shaft sunk to 250 ft., well into the granite formation. The shaft is over 40 in. in diameter. Digging is hard, but shoring and sealing are unnecessary in the dense formation. The cavern is expected to be ready by midsummer. At that time, Sun will decide whether to proceed with additional caverns.

Petro-Tex Chemical Corp. and Plymouth Oil Co. have signed a long-term agreement for the production of alkylate. Site is being cleared by Petro-Tex at its Houston plant for construction of a 3,000-bbl. per day sulfuric-acid alkylation unit. Completion of the unit is scheduled for early 1959.

Petro-Tex will make alkylate from butylenes from its butane hydrogenation plant. The new unit also will produce alkylate for Plymouth from feed stock supplied by Plymouth. All of the alkylate will be of the quality required for aviation gasoline, the companies said.

Construction will start shortly on a natural-gasoline plant south of New Orleans in St. Bernard Parish. Texas Natural Gasoline Corp., Tulsa, and Tennessee Gas Transmission Co., will each own an undivided one-half interest in the plant and its products. Texas Natural will operate the plant. Contract for the plant construction went to Fluor Corporation, Ltd., which should complete the job by November. The plant initially will extract liquids from 150 million cubic feet of gas per day.

Humble Oil & Refining Co. has completed a new benzene plant at its Baytown, Tex., refinery. The new unit is designed to produce about 30,000,000 gal. of high-purity benzene annually.

The company indicated further expansion into the petrochemicals field is planned for the Baytown area.

The new plant is the first to be built on a 40-acre tract in the northwest section of the refinery which has been set aside as a specialty products area. An adjacent 40-acre tract also has been reserved for petrochemical expansion.

The first petrochemical plant to produce aromatics in the Mid-Continent area will go on stream about April 1. Vickers Petroleum Co. says its $2.5 million Udex extraction unit will be completed shortly at the company's Potwin, Kan., refinery. Vickers has organized a chemicals division to market products of the new plant.

Directors of Arkansas Louisiana Gas Co. have approved plans for a subsidiary, Arkansas Louisiana Chemical Corp. The new company will build a $3,000,000 plant near Magnolia, Ark.

Asphalt mats impregnated with insecticide are being used under house foundations to combat termites. Two UCLA entomologists have developed the method, which also protects flooring from ground moisture. A thin mixture is sprayed over the ground where the foundations are to be laid. A 100-house test is planned to test the idea.

Canadian Industries, Ltd., will increase capacity of its polyethylene plant at Edmonton, Alta., from 20,000,000 lb. to 40,000,000 lb. per year. The expansion is scheduled for completion by the summer of 1959.

Also for Refiners . . .

IN THE NEWS: Consultant has recommended that Canada improve market outlook for its oil by cutting wellhead price and pipeline charges and imposing tariff on imports (p. 49) . . . New importers continue to threaten voluntary control program with quota requests (p. 51) . . . American Petrofina will pick up another refinery when its deal to buy holdings of Atlas Corp. is completed (p. 58) . . . Fluor is making Sun's process for treating waste water available to the industry (p. 62) . . . Good-faith price cuts upheld by Supreme Court in second ruling in Detroit case (p. 70) . . . Venezuela completes new refinery at Puerto Cabello petrochemical center (p. 74).

PLUS THESE TECHNICAL REPORTS: Cheaper power generation with gas turbines (p. 88) . . . Nelson refinery construction index (p. 92) . . . Fuel vapor pressure is trending upward (p. 93).

Gulf Prepares Appeal

. . . from contempt conviction by Oklahoma oil agency. Final decision in proration test case is still long way off.

THE STATE of Oklahoma has slapped a $305,000 fine on Gulf Oil Corp. for failing to get permission to cut its purchases of crude oil, but the industry must wait many months—perhaps a year or more—before learning whether the decision will stick.

The long process of perfecting an appeal to the Oklahoma Supreme Court soon will begin. If Gulf loses in the Oklahoma court, the case must then make the same trek through the federal courts.

Meanwhile, there is little likelihood Gulf will get into further trouble with the Oklahoma commission. The company has sold its gathering system and no longer is a major purchaser in the state.

The commission, to no one's surprise, stuck to its contention that Gulf had violated commission rules. It found Gulf guilty of contempt because the company prorated purchases during August and September without first making formal application to the commission and obtaining consent.

There was some surprise, however, in the size of the fine. Although the figure could have been as much as a half-billion dollars, even the $305,000 was unexpectedly large. Most industry observers expected the commission to go fairly light on the fine while establishing its legal right to hold in contempt any company violating the allowable order.

While the industry has a big stake in the final outcome of Gulf's appeal, there were no signs last week that any other company or agency would participate in the case as it makes it way through the appellate courts. Other states, such as Texas, are watching the case as a possible basis for compelling companies to buy ratably at a level set by the regulatory bodies.

The Oklahoma commission contends that the allowable order does not force a company to buy crude it cannot handle but only requires the company to get permission in advance to deviate from the allowable order.

Gulf contends the commission seeks to do indirectly what it admits it cannot do directly.

Gulf charged the Oklahoma commission with setting allowables in excess of market demand and then seeking to force the purchase of crude which must be stored at serious economic loss.

The company also contended that the order would hamper importation of foreign crude and therefore violates the national laws and national policy.

The commission, in handing down its decision, said Gulf was guilty of "willful and deliberate disobedience and violation of the laws of Oklahoma and the orders of this commission."

Of what value education?

Oil Panel Flunks First Test

TEXAS OIL MEN pleaded their case before Sen. Ralph Yarborough last week and ended up listening to an off-season campaign speech.

The junior senator from Texas, identified with the so-called liberal wing of the Democratic Party, listened intently as spokesmen for five oil-industry groups gave him a short course in economics now hampering their business.

The senator gave little indication how effective his brief education had been, for he remained politely noncommittal on most of the problems presented to him.

But he had definite views on some other issues and showed an eagerness to educate the Houston oil group on a few of his nonoil problems.

What he believes . . . After listening to the brief remarks of industry leaders, Yarborough was invited to respond.

Very quickly, nearly 600 oil men present learned that Yarborough did not consider it necessary to reiterate his support of the depletion allowance as it affects domestic oil wells.

They gathered he's not ready to commit himself on the Harris-O'Hara natural-gas bill because the measure may be amended.

They learned he is still in favor of curbing oil imports.

In addition, they heard a politician admit his own ignorance on a legislative matter.

This unusual admission came after Lloyd F. Thanhouser, vice president of Continental Oil Co., appealed to Yarborough to help defeat Senate Bill 11. Thanhouser, a member of the American Petroleum Industries Committee of the American Petroleum Institute, warned that the bill would stifle competition, wipe out independent jobbers, threaten the existence of independent refiners, and be detrimental to the consuming public.

In response, Yarborough confessed he didn't recall ever hearing of the bill before. He promised to take a look at it. But, judging from his past experience with oil-company lawyers, he speculated that the passage of one law in Congress would not put the oil industry out of business.

"You'll probably outsmart them," the senator reckoned.

Side issues . . . Yarborough's comments on the oil industry required little time. Some 30 or 40 minutes later the audience had been educated on a number of other issues. Those who listened carefully learned that:

The oil industry is the second most important industry in Texas.

Agriculture, the most important, suffered from a severe 7-year drouth while the oil industry was relatively prosperous.

Despite its oil wealth, Texas still ranks low in per capita income.

Senator Yarborough himself is coauthor of a new bill which would provide federal scholarships for deserving students.

The panel . . . In addition to Thanhouser, industry spokesmen on the panel included J. U. Teague, president of American Association of Oilwell Drilling Contractors; W. J. Goldston, vice president of Texas Mid-Continent Oil and Gas Association; Raymond D. Reynolds, vice president of Texas Independent Producers & Royalty Owners Association; and Curtis Hankamer, vice president of Independent Petroleum Association of America.

Before the meeting there was widespread speculation that the Houston forum might set the pattern for a series of meetings to acquaint congressmen with the oil industry's problems.

After Yarborough's talk there was little clamor for a repeat performance.

EXCLUSIVE CATERPILLAR "HI-ELECTRO" HARDENING MAKES STEEL TOUGH TO BREAK, HARD TO BEND

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Your Caterpillar Dealer has full information about the new Cat Scraper and 'Dozer cutting edges. See him today.

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CROSS SECTION of edge showing armor-like case and its shock-absorbing core.

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"HI-ELECTRO" hardening machines at the Caterpillar factory give cutting edges the strength to resist breaking and bending.

WHERE TO USE air and gas is a big question in such drilling operations as this one near Eunice, N. M. But AAODC may have the answer with its . . .

New Plan to Cut Drilling Costs

A CENTRAL clearing house for air and gas drilling data is in the mill to help take some of the guesswork out of that method of drilling.

The American Association of Oilwell Drilling Contractors is rounding out plans for a drive to persuade contractors and operators to report each use of air or gas.

The AAODC wants to know the location of each such well, depth and thickness of the sections drilled with air or gas, and exact location of water zones encountered. By compiling this information, the AAODC would be tackling one of the prime deterrents to heavy use of air and gas use in drilling.

The objective of the plan is this: An operator interested in using air or gas at a specific location could contact the AAODC to find out if air or gas was used in previous operations in that area. If so, the data could help him decide what course to take.

The value . . . A contractor or operator interested in drilling a well with air or gas at a certain location now has no way of checking to see whether use of the method might be profitable in that particular area.

Using either air or gas, the driller generally can penetrate rock faster than he can with conventional mud fluids. This is a telling argument in the current age of highly competitive drilling. The clean hole, minus mud cake, is a strong plus from the producer's standpoint, too.

But water remains the big stumbling block. If there are many water zones in a section to be drilled, the technique loses its economic edge. With water present, cuttings ball on the bit, build up at points on the wall of the hole to stick drill pipe, and generally bedevil the operation.

Materials and tools to seal off water zones are available. And they are effective. One expert places effectiveness at 70 to 100 per cent. Materials used are gels which stiffen and plastic resins which set up hard on the face of the water-bearing zone following a squeeze-type operation.

But the materials are expensive, too. The plastic, for instance, runs about $8 to $9 per gallon. The cost is expected to come down with increased use. At present, however, the cost is too high to permit treating many water zones without sacrificing the saving that might otherwise have come from air or gas drilling.

The plan . . . The project is being carried out by the air and gas subcommittee of the association's big rotary-drilling committee.

Maps will be kept up-to-date, showing location of each well in which air or gas was used. The wells will be plotted to show whether they were drilled in such a manner from top to bottom or for just a relatively short section. The subcommittee hopes to be able to supplement the maps with data on water-bearing zones.

The committee hasn't decided yet how to distribute the data to an inquiring party.

M. M. Brantly, subcommittee chairman and president of Brantly Drilling Co., Midland, Tex., says tentative plans call for supplying an areal map with supplementary water-zone data, possibly in the form of an overlay. The service would be on a nonprofit basis, with the recipient paying a fee to cover actual cost to the association.

Union Loses Voting

in futile push to organize West Texas drilling crews.

UNION EFFORTS to organize drilling crews in the Permian basin appeared to have suffered a death blow last week—at least for the present.

Crewmen of Zapata Drilling Co. of Midland, Tex., voted heavily against organization by Local 672 of the International Union of Operation Engineers in a representation election January 30.

Voting in Hobbs and in Plains, Tex., Zapata crewmen repudiated the union by a 26-to-6 count, with all but 6 eligible crewmen voting.

The election was the first in the basin involving a drilling contractor. The union previously was rebuffed in balloting by crews of several large well-servicing contractors. It has yet to win a vote among employes of either servicing or drilling contractors.

The union also recently was dealt a heavy blow when the National Labor Relations Board ruled that drillers of two Midland contractors were supervisors—and thus not eligible for union membership.

This ruling, almost certain to be the same for any other drilling contractor, vastly increased the union's recruiting job. A decision for the union would have had the effect of making roughnecks captive members, since the driller normally furnishes his own crew.

Union Makes Exchange Deal

UNION OIL CO. has signed a 1-year export - import agreement with Maruzen Oil Co., Ltd., of Japan.

Union will furnish Maruzen 2,800,000 bbl. of heavy California crude, diesel oil, and fuel oil. In return,

Maruzen will furnish Union 790,000 bbl. of distillate from Japan.

The agreement does not, Union said, violate the government's voluntary control program on crude imports. The company said it is cooperating fully with the program.

The company recently cut its crude purchases in California fields by 5,000 bbl. per day. It plans to begin buying 10,000 to 12,000 bbl. per day of Four Corners crude when the new pipeline from Four Corners to California starts operating.

Refining Has Gain

in U.S. crude capacity, NPC finds. More expected.

TOTAL CRUDE CAPACITY of the nation's refineries will top 9 million barrels by midyear.

The postwar surge in construction of refining facilities still continues, the National Petroleum Council reported last week to the Interior Department. It will reach 9,207,063 bbl. per day by July 1 and 9,443,302 bbl. by the same date in 1959.

The council made the refining study at Interior's request. A committee headed by Clyde T. Foster of Standard Oil Co. (Ohio) compiled the data.

The report showed there were 293 operable refineries in the U. S. as of March 31, 1957. Combined capacity was 8,939,896 bbl. per day.

Capacity should increase 3 per cent by next July 1 and another 2.6 per cent in the following 12 months.

The study showed that 84 of the 293 refineries have access to tidewater. Their capacity of 5,448,000 bbl. daily is 61 per cent of the total.

Other NPC findings:

... **Improvement** of the quality and yield of gasoline is a major aim in the industry. The capacity for gasoline processing is expanding at a much faster rate than for crude oil charge capacity.

... **Catalytic cracking** charging capacity will, by January 1, 1959, increase 11.6 per cent above the March 31, 1957, level of 3,870,710 bbl. per day.

... **Catalytic reforming** capacity will expand 49 per cent above its March 31, 1957, level of 1,176,960 bbl. daily.

... **Production** of pentane-free alkylate will increase 35 per cent, from 260,980 to 351,627 bbl. per day.

The NPC committee noted a significant change in the capacity for hydrogen treatment. This will increase 84 per cent by July 1, 1959, from 922,776 to 1,693,346 bbl. daily.

Pipeline briefs

Conversion of the "Little Inch" pipeline from natural gas to the products service for which it was built during World War II is now a fact. The FPC has given its third, and final, approval to Texas Eastern Transmission Corp. for taking the line out of gas service. Its action ends a 2½-year fight in which the case went through court action twice.

United Gas Pipe Line Co.'s application to build 203 miles of 30-in. loops between New Orleans and Mobile, Ala., has been accepted for filing by the Federal Power Commission. The $33,770,618 program includes 78.7 miles from near New Orleans to Hancock County, Mississippi; 38 miles from Harrison County to Jackson County, Mississippi; and 86 miles of line paralleling sections of United's southeast Louisiana - Mobile line.

Portland Pipe Line Corp. and Montreal Pipe Line Co., Ltd., which expanded pump stations on their Portland, Me., to Montreal crude system last year, will lay 50 miles of 22 and 24-in. loops this year. A contract has been awarded to Oklahoma Pipe Line Constructors, Dallas, to lay 39 miles in the U. S. and 11 miles in Canada along the 242-mile, dual 12 and 18-in. system. Work will get under way in the spring.

Transcontinental Gas Pipe Line Corp. will complete another phase of its gathering-system construction in South Texas early next month.

Lone Star Constructors, Inc., Dallas, is laying 30 miles of 16, 14, 10, and 4-in. in McMullen and LaSalle counties, terminating at Tilden on the Transco system. The contractor kicked off January 2 on the project involving an experiment with a new protective pipe coating. An epoxy-coal tar applied in the yard is being used rather than conventional coal tars and asphalts applied over the ditch (OGJ, Dec. 16, 1957, p. 70).

Trans Mountain Oil Pipe Line Co. delivered an average of 154,891 bbl. daily of crude during 1957, an increase of 20 per cent over the 1956 figure of 129,103 bbl. daily. Deliveries during December, however, were only 103,967 bbl. daily. This was 23,927 bbl. daily above the previous month but only a little over half the spring peak before loss of the offshore market and reduction in demand for Canadian crude in the U. S. Pacific Northwest.

Hearing on a gas line proposed by Canadian Western Natural Gas Co., Ltd., from Carbon field to Calgary will start February 25 before the Alberta Oil and Gas Conservation Board. The 58-mile, 16-in. line will ultimately supply 150,000 M.c.f. daily for peak demand periods in winter. Initial peak deliveries are scheduled for 40,000 M.c.f. daily. The trunk line and gathering system will cost $9,500,000.

Winnipeg & Central Gas Co. proposes to reorganize along lines suggested by Stone & Webster, U. S. engineering and management firm, after ending the year $596,832 in the red.

The plan is to reduce equity capital on the basis of one share of the new issue for each five now held. The new financial structure would include bonds, debentures, and convertible preferred shares. Some $4,000,000 of first-mortage bonds would be accepted by banks which hold demand notes of $5,500,000.

Winnipeg & Central has a contract with Trans-Canada Pipe Lines, Ltd., to distribute natural gas in the Winnipeg area, but has met strong opposition from other utilities.

Also for Pipeliners . . .

IN THE NEWS: Cut in pipeline charges recommended as part of plan to make Canadian crude competitive (p. 49) . . . New Mexico may start fight to force pipelines to connect wells (p. 50) . . . More Alberta gas is signed for California market (p. 57) . . . Cherokee Pipe Line to double capacity by converting Tulsa-to-Wood River crude to products (p. 60) . . . FPC approves Gulf Interstate's expansion plans (p. 63) . . . Gas bill foes are preparing for battle in Congress (p. 68) . . . FPC is protecting gas pipelines from effects of Memphis decision until issue is finally settled (p. 70) . . .

PLUS THESE TECHNICAL REPORTS: Muskegon pipeline was a tough job (p. 85) . . . Pipeline construction report (p. 117).

Huge Fork-Lift Truck Builds Power Units

THIS TEXAS-SIZE MONSTER, the biggest of its kind in the Southwest, went to work last week in Beaumont assembling diesel-electric power units for Alco Products, Inc.

The truck is used to position engine-generator sets, motors, and control cabinets in assembling Alco's Power Package units. The Beaumont plant was officially opened January 29. Previously, the packaged power units, used largely on offshore drilling rigs, were assembled in Schenectady, N. Y.

The fork-lift truck in the photo has the strongest lifting mechanism ever devised for a fork unit, giving it a lifting capacity of 20 tons.

Gas Bill Foes Gear for Battle

CONGRESSIONAL opponents of the Harris-O'Hara gas bill are lining up for an all-out fight when the bill comes up for a vote on the House floor next month.

A baker's dozen House members met last week to plan their strategy. The group, headed by Reps. John W. Heselton of Massachusetts and Peter F. Mack, Jr., of Illinois, will try to enlist support of consumer-state delegations.

Heselton is ranking Republican member of the House commerce committee, which voted the bill out last year. Mack is No. 1 Democratic member, outranked only by Chairman Oren Harris of Arkansas.

The Harris-O'Hara bill would protect independent gas producers from utility-type regulation by the Federal Power Commission. The bill, which is now before the House rules committee, is scheduled to come up on the House floor for a vote next month, regardless of whether a poll shows enough support to insure its passage.

Speaker Sam Rayburn of Texas disclosed the plan for a House vote last week. "We may as well go ahead and vote it up or down," he said.

The bill failed to reach the House last year because a poll raised doubt whether there would be enough votes to pass it.

Coal support . . . The pipelines and coal interests, meanwhile, were reportedly nearer an agreement which would insure coal-state support for the measure.

The coal interests demanded a clause in the bill banning below-cost sales by pipelines which were seen as offering the stiffest competition to coal.

Pipeline interests may go along with the demand, provided they are given an exemption for off-season sales for underground storage. The exemption would protect local distributors.

A similar exception is also sought for industrial sales which come under the control of state commissions. The pipelines are reported to be unable to agree on the type of amendment they can support.

——*Industry* briefs

Gulf Oil Corp. may construct a new building for its production division in Tulsa. W. K. Whiteford, Gulf president, said the matter is under consideration, but that it may be a year or more before something definite is decided. Site of the building would be adjacent to the recently completed headquarters for Warren Petroleum Corp., a Gulf subsidiary. Gulf employes in Tulsa are now housed in a building in downtown Tulsa, about a mile from the Warren office.

Hugh A. Stewart, director of the Interior Department's Office of Oil and Gas, resigned last week, after 9 years of serving in the department. Sec. Fred A. Seaton is expected to announce his successor in the next few days.

Stewart was named director of the Oil and Gas Division in 1949. During the Korean War the division was part of the Petroleum Administration for Defense, and he was assistant deputy administrator. He returned to his original post after PAD was dissolved. Before joining Interior he was with The Texas Co. for 25 years.

Oklahoma's oil production allowable for February will continue at its January level of 600,000 bbl. per day. The Corporation Commission has held the allowable at virtually the same figure for several months. Actual production is expected to average about 585,000 bbl. per day.

Imports of Standard Oil Co. (N. J.) through May will average less than the company's allocation of 72,000 bbl. daily. During the first 5 months of 1958 the company expects to import an average of 71,300 bbl. daily. Its December imports averaged only 58,000 bbl. daily. Through a typographical error, the Journal last week showed Jersey's imports quota as 66,800 bbl. daily (Jan. 27, p. 123), indicating its 1958 imports would exceed its quota.

The Interstate Oil Compact Commission has published the third in a series of secondary-recovery surveys prepared by the Engineering Department of the Texas Railroad Commission. The survey contains data to January 1, 1956, on 194 secondary recovery and pressure maintenance projects initiated between January 1, 1954, and September 1955. The survey also contains supplemental information on 436 projects reported in 1952 and 1954 surveys.

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Ask your Lunkenheimer Distributor for a comparison test that will save you maintenance dollars, or write The Lunkenheimer Company, Cincinnati 14, Ohio.

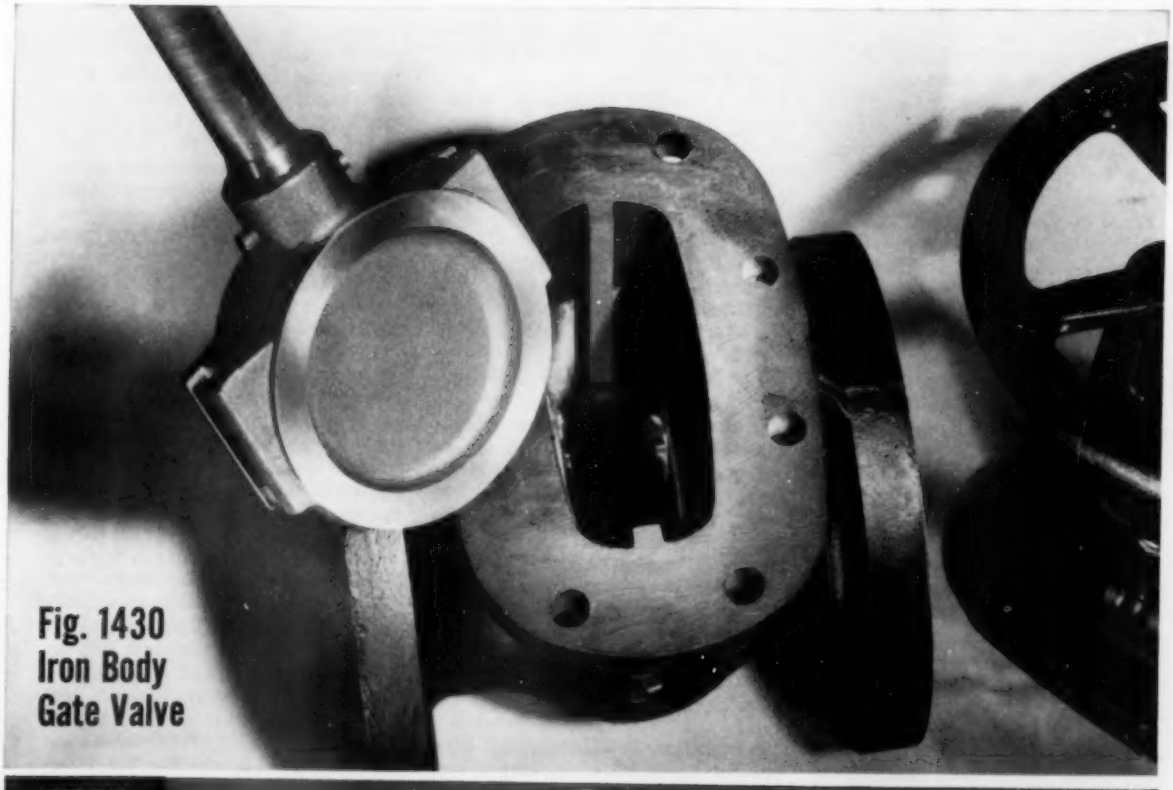

Fig. 1430
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FPC Drags Its Feet

. . . in requiring compliance with Memphis decision. Action suggests firms will be shielded until courts settle issue.

THE FEDERAL Power Commission will protect natural-gas pipelines against the effects of the Memphis decision so long as the issue remains in doubt.

FPC made this clear in refusing to dismiss the application for a $16.5-million rate increase filed last July by El Paso Natural Gas Co. and put into effect January 1 under bond and subject to refund.

The Memphis decision of the District of Columbia Appeals Court held that the FPC could not accept a rate-increase application unless all customers of the pipeline had previously agreed to the hike.

The U. S. Solicitor General appealed the case to the Supreme Court on behalf of FPC. United Gas Pipe Line Co., Texas Gas Transmission Corp., and Southern Natural Gas Co. also have filed petitions for review.

A motion to dismiss the El Paso application was filed with FPC by six of its customers, the California Public Utilities Commission, and the State of California. The motion contended that the Memphis decision rendered the FPC impotent to pass on the increase.

The FPC, in denying the motion, said it must, and does, give full effect to court decisions. But the commission added that it is not convinced that the reasoning of the appeals court "represents the intention of Congress as expressed in the Natural Gas Act." Nor would it be in the public interest to follow that decision until the final word has been spoken by the Supreme Court.

The system . . . The pipelines originally based their rates on private contracts with individual customers. In 1948, FPC adopted the system under which rate schedules are filed in tariff form, thus simplifying and speeding up their review. In this way it deals with only about 100 tariffs instead of many thousands of separate gas contracts.

Under current market conditions, the prices arrived at by contract would tend to be higher than those finally becoming effective under the system knocked down by the Memphis decision, FPC believes.

Already, the commission said, there are indirect effects resulting from present uncertainties. These include the cancellation or postponement of pipeline expansion.

The present system permits the pipelines to proceed with expansion while rate increases are collected subject to refund pending final decision.

This would not be possible under the Section 5 procedure which the court held is the only way in which increases can be considered.

Under the ruling, FPC would have to examine all the separate contracts of a pipeline company. If it found them to be discriminatory, preferential, unjust, or unreasonable, it could prescribe tariff form rates. Only then could the company file rate changes, under Section 4, without the consent of its customers.

Inevitably, this would cause additional work and delay, the commission said.

Fifty-three rate increases involving some $226 million a year are now pending before FPC. About $216 million already has been collected subject to refund.

The effect of the Memphis decision on current operation of the pipelines would be "very serious" if they had to refund all of these collections in cash, the commission pointed out.

Good-Faith Price Cuts Upheld

. . . by Supreme Court in second ruling in "Detroit case." Legislation to limit good-faith defense may be pushed.

A NEW CAMPAIGN is expected to take shape soon in Congress attempting to limit application of the good-faith defense for cutting prices to meet competition.

That's the first reaction in Washington to last week's Supreme Court ruling in the "Detroit Case." The court ruled 5-4 to acquit Standard Oil Co. (Ind.) of violating the Robinson-Patman Act in connection with gasoline sales in the Detroit area in 1940. The court held that Indiana Standard's two-price system fell "far short" of illegal discriminatory pricing. This is the court's second ruling in the case.

The dispute hinged on this dual-pricing system: Indiana Standard gave four large Detroit gasoline jobbers who had retail outlets tank-car prices but charged higher tank-wagon prices to 350 other retail dealers. The jobbers got the cheaper price to keep them handling Indiana Standard gasoline after competitors had tried to lure them away.

The court had ruled 7 years ago in the same case that companies acting in good faith to meet competition could charge different prices on the same commodity under the law.

The opinions . . . The court's latest opinion was delivered by Justice Tom Clark. Justices Warren, Douglas, Black, and Brennan dissented.

Clark noted that the opinion was confined to the Indiana Standard case. Similar cases against Gulf Oil Co., The Texas Co., and Shell Oil Co. have been dropped by the Federal Trade Commission, he said.

"The findings show that both major and local suppliers made numerous attempts to lure these jobbers away from Standard with cut-rate prices, oftentimes much lower than the 1½-cent reduction Standard was giving them," Clark said.

Clark pointed out that the question was not why the reduced prices were first granted. Rather, he said, is was why the reduced price was continued after passage of the Robinson-Patman Act in 1946.

The Seventh Circuit Appeals Court (Chicago) made a "fair assessment of the record" when it found in favor of the company last year, Clark said.

A dissenting opinion was filed by Justice Douglas. The majority ruling, he said, "today cripples the enforcement of the Robinson-Patman Act."

"The mere fact that a competitor offered the lower price does not mean that Standard can lawfully meet it," Douglas contended.

Possible bills . . . The whole issue has been fought to the Supreme Court twice in the 18 years since the FTC first issued its order against Indiana Standard. Bills to offset effects of the 1951 Supreme Court decision also have been filed in each Congress since. A measure passed the House in the last Congress by 393-3 but was not taken up by the Senate.

Small business supporters on both sides of the Capitol now are expected to make a new drive for legislation.

But manufacturers and jobbers, who paid little attention to the bill when first offered, since have been pressing their objections.

New Interest in Paraguay

. . . touched off after 10-year lull. Rimrock makes deal to probe big concession. Pure plans wildcat on new block.

LANDLOCKED PARAGUAY, one of the few South American countries with no oil production, is getting a new and closer look.

Ignored by oil prospectors for the last 10 years, Paraguay is attracting attention. Two companies have been granted large exploratory concessions in the Chaco region. At least two other firms are reported to be dickering for acreage in the same area.

Paraguay's Chaco Boreal borders productive areas in both southern Bolivia and northern Argentina. Union Oil Co. of California pulled out of the area in the late 1940's after drilling five dry holes (see map).

In the last few months two things have focused new attention on Paraguay:

. . . **Rimrock Tidelands, Inc.,** which only last week stepped into foreign oil, will drill in Paraguay under an agreement made with one of the country's concession holders, International Products Corp.

. . . **Pure Oil Co.** plans an immediate test of its newly acquired concessions of more than 23,000 sq. miles.

Williams Brothers Sudamericana, Inc., subsidiary of the Tulsa pipeline construction firm, has about a 50 per cent interest in the Pure concession (OGJ, Oct. 14, 1957, p. 120).

The Rimrock deal . . . Charles A. Koons, chairman of the board of International Products, and H. L. Rowley, president of Rimrock, said last week that Rimrock will drill the 7,500,000-acre concession held by International Products.

The announcement came just a week after Rimrock management disclosed it has bought control of Mofag Oil Exploration Co., which owns exploration concessions in Switzerland and France (OGJ, Jan. 27, p. 144).

Rimrock will move a rig from Louisiana to test the three-tract Paraguayan concession. Plans call for the "earliest possible" start of drilling operations. Rimrock will be the operator and drilling contractor for the two-company venture.

No site for the first test has been disclosed, but the initial well will probably be drilled on one of the two concession tracts along Paraguay's northwestern border. The two tracts total about 4-million acres.

One long narrow strip along the Bolivia - Paraguay border is opposite Camiri, Sanandita, and Bermeja fields in Bolivia. These three fields account for most of Bolivia's 10,000 bbl. of daily crude production.

A larger triangular-shaped concession tract to the south is along the Argentine-Paraguay border. It is east of Argentina's Madrejones and Campo Duran fields in Salta Province where most of the country's 90,000 bbl. daily oil production comes from.

International Products' third concession tract, about 3,500,000 acres, is in Northeast Paraguay along the Bolivian-Brazilian border and is east of Pure Oil's large concession.

The Rimrock rig will be able to make the trip almost all the way by water in spite of the fact that Paraguay is inland. The Parana and Paraguay rivers will be its route at least as far as Asuncion. The two companies said last week rail and surface road transportation will finish the trip.

The operator will have access to the facilities which International Products already has in Paraguay. Koons said last week these will include machine shops, foundries, and surface and air transportation.

International Products is the largest industrial concern in Paraguay. It owns more than 2-million acres of cattle ranges and timber lands, more than 65,000 head of cattle, a meat slaughtering and packing plant, can manufacturing facilities, a quebracho extract factory, and a railroad.

Union's efforts . . . Union Oil carried on an extensive exploration program over a 23-million-acre concession it held in the Chaco region 10 years ago. Union pulled out after drilling five dry holes.

One of them, Pirizual 1, went to 10,331 ft. in the southeastern portion of what is now International Products' triangular tract along the Argentine border.

Another deep test, drilled by Union was Picuiba 1 in the extreme southern portion of what is now Pure's concession. It was bottomed in shale at 7,515 ft.

Three more Union tests lie in the region to the south of Pure's acreage and were located roughly in the center of the Chaco region. They were drilled to 5,866, 6,715, and 7,579 ft. before all were abandoned.

World Output Falls Again

. . . in most major areas. Iraqi gain helps offset big Middle East drop. Venezuela takes tumble.

THE DECLINING TREND of free-world crude production continued for the fifth month in November as sluggish markets affected all major producing areas.

In the Western Hemisphere, Venezuelan output was down for the fourth time in 5 months. It was more than 400,000 bbl. daily below the all-time high of June. U. S. output was off for the third month. Canadian production hit its lowest level in 1½ years.

Middle East producing companies on the whole had the poorest month since May. Operators in Kuwait, Saudi Arabia, and Iran all reported cuts.

Basrah Petroleum Co., Ltd., was an exception. The Iraq Petroleum Co., Ltd., affiliate produced a record 243,900 bbl. daily from Iraq's southern fields. The increase was made possible by improved terminal facilities at Fao, the country's only export outlet on the Persian Gulf.

Trend Over the Last Year

	Western Hemisphere less U.S.	Middle East	Total, Free World outside U.S.
1956			
Nov.	3,781.3	2,153.7	6,587.3
Dec.	3,915.9	2,428.9	6,989.7
1957			
Jan.	3,993.9	2,645.7	7,301.7
Feb.	4,040.7	2,855.5	7,561.6
Mar.	4,117.8	2,764.3	7,582.0
Apr.	4,111.5	3,140.0	7,985.0
May	4,116.0	3,556.1	8,407.3
June	4,160.6	3,957.3	8,872.5
July	4,076.2	3,989.4	8,824.7
Aug.	3,924.5	3,955.0	8,649.6
Sept.	3,759.6	3,969.5	8,504.6
Oct.	3,764.6	3,878.9	8,441.3
Nov.	3,671.1	3,704.2	8,158.3

World-Wide Crude Production: Daily Average in Thousands of Barrels

Country—	November 1957	October 1957	November 1956
Western Hemisphere			
Argentina	96.2	101.7	88.2
Bolivia	10.0	10.0	9.1
Brazil	30.9	30.9	18.3
Canada	428.2	458.8	518.7
Chile	13.0	13.0	10.6
Colombia	125.7	124.8	122.8
Cuba	1.2	1.2	1.2
Ecuador	9.2	9.2	9.0
Mexico	245.0	245.0	246.8
Peru	52.1	52.1	48.8
Trinidad	97.0	96.9	84.5
Venezuela	2,562.6	2,621.0	2,623.3
Total	3,671.1	3,764.6	3,781.3
Europe			
Austria	57.2	57.2	65.4
France	26.9	26.9	27.8
West Germany	79.0	79.1	70.2
Italy	21.7	26.6	15.9
Netherlands	31.5	32.1	23.2
Turkey	6.2	6.2	7.5
United Kingdom	1.6	1.6	1.4
Yugoslavia	8.0	8.0	6.3
Total	232.1	237.7	217.7
Middle East			
Bahrain	33.1	34.5	30.1
Iran*	712.0	768.0	532.0
Iraq†	604.4	550.3	187.6
Israel	1.2	1.2	1.0
Kuwait	1,107.0	1,257.6	561.2
Neutral Zone	90.0	80.0	33.0
Qatar	142.7	142.6	89.0
Saudi Arabia	1,013.8	1,044.7	719.8
Total	3,704.2	3,878.9	2,153.7
Other Asia			
British Borneo	118.0	118.0	117.9
Burma	9.2	9.2	5.0
India	8.5	8.5	9.2
Indonesia	338.0	347.0	268.1
Japan	6.3	6.3	5.9
New Guinea	5.6	5.9	7.3
Pakistan	5.9	5.9	5.9
Total	491.5	500.8	419.3
Africa			
Algeria	0.2	0.2	0.4
Egypt	53.6	52.5	13.3
Gabon	5.1	5.1	
Morocco	1.5	1.5	1.6
Total	60.4	59.3	15.3
Free World			
Foreign	8,159.3	8,441.3	6,587.3
United States	6,824.0	6,860.0	7,139.0
Total	14,983.3	15,301.3	13,726.3
Communist Countries in Soviet Orbit			
Romania	220.0	220.0	218.0
Russia	2,050.0	2,025.0	1,600.0
Others	50.0	50.0	50.0
Total	2,320.0	2,295.0	1,868.0
WORLD TOTAL	**17,303.3**	**17,596.3**	**15,594.3**

*Includes estimated 5,000 bbl. daily from Naft-i-Shah field not operated by consortium companies.

†Includes estimated 3,600 bbl. daily from Naft Khaneh field, operated by British Petroleum Co.

Figures are from reliable industry reports or official government sources. Data for Communist countries in the Soviet orbit, which includes the European satellites and Red China, are based on competent estimates. Authentic information is not available on month-to-month production in these areas. Estimates also were made where complete reports are lacking.

Deep German Test

to be abandoned at 14,823 ft. in Permian salt layer.

GEWERKSCHAFT Brigitta is trying to abandon its Cismar 3, the deepest well ever drilled in West Germany.

The drilling crew is fighting a high pressure water column in the 14,823-ft. hole. The same trouble was encountered in the first two wells on the structure.

Cismar 3 was completed in the Zechstein, which is the salt member of Permian, after drilling through a salt dome. It is located about 30 miles east of Kiel, near Heiligenhafen, on the Baltic Coast of northern Germany.

Brigitta is jointly owned by Royal Dutch-Shell and Standard Oil Co. (N.J.).

San Jacinto Switch

splits up activities among several operating divisions.

TO KEEP PACE with its expanding operations in both the United States and abroad, San Jacinto Petroleum Corp. has revised its corporate setup and moved its headquarters from Houston to New York.

Under the new organization San Jacinto Petroleum Corp. will act as a holding company, supervising the operations of several new divisions and subsidiaries. Benno C. Schmidt, chairman, will take on the additional title of president of the holding company. John E. Kilgore, Jr., will head an executive committee to oversee the activities of all the subsidiaries.

Domestic operations will be handled by a newly formed subsidiary, San Jacinto Oil & Gas Co., with headquarters in Houston. B. G. Martin, formerly president of the corporation, will head up the oil and gas company as president.

Venezuelan operations will be conducted by San Jacinto Venezolana, C.A., a wholly owned subsidiary with offices in Caracas and Maracaibo. L. W. Goodrich, head of production operations for the parent corporation for the past 3 years, has moved to Maracaibo as vice president of operations for the Venezuelan company, which has a 25 per cent interest in the 24,700-acre Lot 10 and a 30 per cent interest in the 1,967-acre National Reserve Lot V-575 in Lake Maracaibo.

Other subsidiaries are San Jacinto Eastern Corp., which holds the company's one-twelfth of 5 per cent interest in Iranian Oil Participants, Ltd., and San Jacinto Service Co., a newly formed subsidiary handling crude-oil marketing. Both these companies are headquartered in New York. John K. Schemmer is president of both.

New African Plant

to go on stream this month. Expansion planned later.

PETROFINA expects to open a 2,000-bbl. topping plant in Angola, West Africa, by mid-February.

The plant is located on Luanda Bay, 2 miles north of the city of Luanda, capital of the Portuguese colony. Construtora Moderna, a Portuguese firm, is reassembling equipment from a refinery purchased in Italy by Petrofina.

The plant is going up at Luanda field, discovered less than 2 years ago on the outskirts of the capital. Production is from two zones in Lower Cretaceous limestone at about 5,600 ft.

Cia. Concessionaria dos Petroles de Angola (Cota), newly formed by Petrofina and Portugal, will handle both production and refining (OGJ, Jan. 6, p. 88). The present unit will be part of a larger refinery which will be built later.

Luanda field is the second discovered in Angola. Benfica field, 20 miles south, was found 3 years ago. Both produce from the same formations.

Petrofina has three rigs in the colony. One is drilling development wells at Luanda, and two are wildcatting. One test is under way at the mouth of Cuanza River, south of Benfica. The other is near Calumbo.

Petrofina reportedly plans to bring in a fourth rig soon. Three seismic crews are in the area.

Peru Spread Eyed

by Texas Co. It's seeking 1,200,000-acre concession.

THE TEXAS CO. is negotiating for exploration rights on an additional 1,200,000 acres in eastern Peru.

The company hopes to get official approval soon on an agreement giving it two-thirds interest in acreage lying between the Maranon and Huallaga rivers, north of the town of Yurimaguas.

The remaining one-third interest will be held by Petrolera Yurimaguas. This company is a wholly owned subsidiary of Cia. Peruana de Petroleo el Oriente, S.A., which now holds the acreage.

If the government approves the deal, a subsidiary of The Texas Co., Texas Petroleum Co., will be the operator. It will drill the first well near the Huallaga River, a few miles north of Yurimaguas.

Texas Petroleum Co. already holds exploration rights on 2,470,000 acres in eastern Peru. Much of the acreage is in the same general area where it is seeking the new blocks.

El Oriente is a local Peruvian company.

Tanker Company

set up by Kuwait interests. Shaikhdom spreading out.

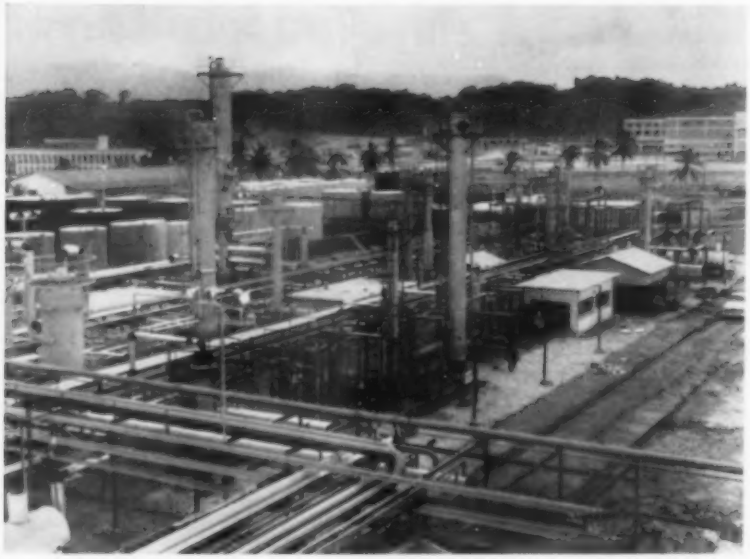
KUWAIT BUSINESSMEN have put their foot in the door of the tanker business.

The operation is small compared with the vast world-wide tanker industry. But it smacks of Western enterprise, and it is a step into another area of the industry besides crude production.

Kuwait interests have formed Kuwait Oil Tanker Co. with a reported capital of $17,000,000. The firm is not believed connected with Kuwait Oil Co., Ltd., the crude producing company in the shaikhdom, owned by Gulf Oil Corp. and British Petroleum Co., Ltd. The shaikh, however, probably has an interest.

The new company has ordered a 46,000-ton tanker from a Japanese shipyard. It will be delivered in June 1959. Other ships may be ordered later. Common Brothers, a British tanker company, has been engaged to manage the Kuwait company.

Investment abroad is not new to Kuwait leaders. The shaikhdom for years has invested one-third of its oil income in blue-chip securities on the London market.



PETROCHEMICAL center near Puerto Cabello sprouts new pilot plant as . . .

Venezuela Completes Refinery

THE VENEZUELAN Government has completed a 3,000-bbl. pilot refinery as part of its multimil ion-dollar petrochemical complex in the Puerto Cabello area west of Caracas.

The new plant at Moron will produce a full range of products and will also turn out feed stocks for the $300-million-dol ar petrochemical center being built by the government agency, Instituto Venezolano de Petroquimica.

The small, modern refinery is the first step in a program calling for the eventual construction of a 40,000-bbl. refinery at the site. The government agency will use the pilot plant for research and for training refinery personnel.

Units at the small plant include a 1,200-bbl. atmospheric crude unit, a 1,800-bbl. combination crude unit, a 50-bbl. UOP polymerization unit, an 850-bbl. Union Oil Co. Unifining unit, a 575-bbl. Cycloversion catalytic gasoil cracking unit, and a 350-bbl. Atlantic catalytic reforming unit. A Udex aromatics extraction unit is also under construction, with completion scheduled within the next 2½ months.

The p'ant was bought from Tifco Inter-America Corp. and shipped from Houston last spring. It will charge 27°-gravity Barinas crude and will produce a full range of motor gasolines, diesel fuel, kerosines, fuel oils, and paving asphalts. Benzene and toluene will be produced along with a mixed xylenes stream.

The Unifining unit will operate to treat a combined gasoline, diesel, and kerosine stream with final products being fractionated following their pass through the unit. The Catformer is designed to operate on both high and low pressure, depending on whether production of reformate or aromatics is desired.

Big project . . . The government has budgeted about $300 million for construction of the big petrochemical center over the next few years (OGJ, Apr. 22, 1957, p. 97).

The program includes construction of plants for production of synthetic rubber, plastics, chlorine and caustic soda, fertilizer, sulfuric acid, explosives, weed killers, insecticides, and fungicides. The government is also building a natural-gas line from the Anaco area to nearby Caracas.

Field in India Growing

ASSAM OIL CO., Ltd. has completed its fourth producing well in the Moran area of northeastern India in the best time so far logged on the license.

Moran 6 was completed at a total depth of 11,622 ft. in 40 days. The company called production tests "very promising". The well was the second producer in a row drilled by the Burmah Oil Co. Ltd., subsidiary. The Nos. 3 and 4 were dusters. The rig has already spudded Moran 7.

Assam Oil has spudded Nahorkatiya 31 in the license area 25 miles west. The Nahorkatiya-Hugrijan and Moran license areas will supply crude to refineries to be built jointly by the Indian Government and Burmah Oil. A new joint company, Oil India Private, Ltd., has been set up to take over development of the fields (OGJ, Jan. 27, p. 143).

Greek Plant Leased

to Socony and two business men. Niarchos in on deal.

SOCONY Mobil Oil Co., Inc., and two Greek business men have won a 10-year lease on the new 30,000-bbl. refinery near Athens.

The government made the award to a private Greek company formed by Socony Mobil, Bodosakis Athanassiades, and Tanker Magnate Stavros Niarchos.

The $25-million refinery is expected to supply local marketing companies with most of the requirements of all major products in Greece. Exceptions are aviation gasoline and lubricating oils, which the plant does not manufacture.

This market plus the fact that the refinery is a new outlet for Middle East crude made the lease a highly sought prize. Socony is one of the oldest and largest marketers in the country.

The government had set stiff minimum requirements for bidders. This included a $500,000 guarantee on deposit, and minimum rental of at least 90.5 per cent of net profit (OGJ, Jan. 20, p. 101).

U. S. Firm to Drill in Algeria

SOUTHERN CALIFORNIA PETROLEUM Corp. is shipping two rigs to Algeria in a joint venture contract with a French company.

Camay Drilling Co., a division of Southern California, shipped one heavy rig in January. The outfit is enroute to Hassi Massaoud field, the big French discovery in North Africa. Another heavy rig will be shipped from Beaumont about February 9.

Camay Drilling has one-fourth interest in a joint venture contract with Cie. Industrielle de Travaux of France (Citra, a Schneider Enterprise). The Camay-Citra combine is shipping the rigs to Hassi Massaoud under a drilling contract with Cie. Francaise des Petroles d'Algerie.

Southern California is no newcomer to Africa. A subsidiary, Camdrill International, Inc., has two rigs running in Libya. The parent company also held an interest in Belayim and Feiran fields in Egypt 2 years ago.

OIL AND GAS TRANSMISSION LINES

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Part 1 **VENEZUELAN KNOW-HOW**

Looking at Venezuela for opportunities?

• Here's the first part of a study that will help you decide whether you'll want to take the plunge

By Harry A. Franklin and W. Doyle Miller

WITH the large increase in Venezuelan drilling activity at the present time and with much more to come, there are good opportunities for the entry of additional drilling firms, drilling equipment sales and distribution, and field drilling service. However, to form a proper basis for consideration of these opportunities, it is important to have good knowledge of the history of drilling operations and drilling conditions in Venezuela.

In the late twenties . . . During this period, drilling crews were manned by expatriate personnel. Nearly every rig running belonged to the oil companies.

Later, during the thirties, national personnel were trained and by 1940, under this program, all crews consisted of Venezuelans. The companies prior to 1952 generally had, throughout each of their various operating districts, an expatriate drilling superintendent, an expatriate tool pusher assigned to one or more rigs (spreads) on each tour, and national crews.

During the late forties . . . Independent drilling contractors began operations in Venezuela. These first contractors were concentrated mainly in eastern Venezuela, and in many instances were sponsored by the operating companies who sold them rigs from their inventory. Eastern Venezuela also afforded conditions similar to those of the United States; i.e., many smaller oil fields, excellent terrain, passable or easily constructed roads and, in most cases, easier drilling than that of the western portion of Venezuela.

In the early fifties . . . Mainly because of better roads and lake transportation, companies began to consolidate district supervision, thus reducing drilling costs. Experienced national crews also enabled this consolidation to progress and be satisfactory.

Presently a goodly percentage of the Venezuelan drilling is being done by drilling contractors, and in several instances the major oil companies depend entirely on them for all of their drilling, having either sold their rigs or stacked them in their yards.

Even more drilling contractors entered Venezuela during 1957, adding to the ever-growing list of available contractors. These included Helmerich & Payne, Inc.; Falcon Seaboard (D & D Drilling Co.), Kerr-McGee, Offshore Co., "The Flying Dutchman," Reading & Bates.

In January 1958, 155 rigs were operating in Venezuela, including workover and 44 contract rigs.

Maracaibo Area—Western Venezuela

State of Zulia . . . This is the big "lake" territory, and environs to the west. Drilling conditions vary widely. Miocene formations in western Venezuela, especially in the Lake basin, drill fast and a record 24-hour penetration of 3,800 ft. plus has been established.

Eocene formations of the basin drill quite hard and compare to drilling in the West Texas deep formations. Mud problems in the upper formation are nil, and in past years water has been used extensively for the drilling fluid to 3,500-4,000 ft. or to top of the Miocene. Jet-bit drilling is increasing.

Penetration rates for various Lake areas range as follows: Younger Tertiary, 35-150 ft. per hour; Eocene, 4-27 ft. per hour.

North and west of Maracaibo much drilling is being done, and has been done, in the Cretaceous formation. Lost circulation is encountered in many wells and close attention is given to mud weights and condition. Considerable drilling is done in the "granite" in this area as large-volume producers have been completed at depths some 2,000 ft. in the basement. Drilling this formation is extremely hard and slow, thus very costly. A recent per rig day contract of $3,000 per day has been let in the area north of Maracaibo.

Penetration rates for different spots in the above territory range as follows:

Basement—Mara area	3- 9 ft./hr.
Eocene—La Paz area	15-30 ft./hr.
Eocene—Sibucara area	8-15 ft./hr.
Eocene-Bachaquero area	15-20 ft./hr.
Eocene—Lagunillas area	10-30 ft./hr.

Offshore . . . Drilling in Lake Maracaibo has now progressed to the extent that many wells are drilling some 12 miles offshore. Water depths vary from 30 ft. near shore to slightly over 100 ft. in the center of the lake. Lake-bottom conditions vary from soft muck sometimes 50 ft. deep to hard sands. Before driving a foundation, it is essential to drive test piling to determine the penetration of the foundation piling during construction. Foundations are built on concrete piling, steel piling, or a combination of both. Some recent foundations have been built of aluminum.

Costs of foundations vary from $45,000 to $60,000 (assembly-line construction) to $120,000 where construction is done by contracting companies. Two commercial companies offer well-foundation construction service: Raymond Concrete Pile Co. and J. Ray McDermott.

Lake transportation is supplied by marine craft. The major companies operate the bulk of their own sea craft. Contract transportation is available and the service is expanding. During the past few months a major transportation company has been formed which offers adequate marine transportation to meet most of the present requirements. This com-

The articles in this series are prepared from a voluminous report by the authors, left, which is composed of the main section and six supplements.

Titles of the complete set . . .

No. 1 (main report)—"Operating Requirements, Techniques, and Procedures for Prospective Oil and Gas Operators in Venezuela"

No. 2—Concession Map of Oil Fields in Venezuela

No. 3—Oil Companies, Government Agencies, Consultants, Service Companies, and Drilling Companies

No. 4—Venezuelan Labor Law—Its Reforms, Regulations and Decrees, and Petroleum Industry Collective Contracts

No. 5—Venezuelan Income Taxes and Fiscal Stamp Tax Law

No. 6—Code of Commerce

No. 7—Miscellaneous Data

About the authors . . .

Harry L. Franklin, at right above, is a veteran of Venezuelan activity with several firms, including Socony-Vacuum Oil Co., Inc., and Shell Oil Co. After 5 years as exploitation engineer for Shell in the area, Franklin joined DeGolyer & MacNaughton, Inc., as petroleum-engineering representative in Brazil in 1953. Following a period as production manager for U. S. and Canadian operations of Harry Bass Drilling Co., Franklin became a consultant in Dallas last year. He is a graduate of University of California.

W. Doyle Miller, left above, broke into the oil business even before his graduation from Oklahoma State University, with various Shell-affiliated companies. He was later with Dowell Incorporated for 7 years before becoming consultant to Petroleos Mexicanos. He left Pemex in 1945 to join Creole Petroleum Corp. in Venezuela. He rose to production manager, but took early retirement in 1954 to enter consulting work. A year later he became vice president, operations, for Dresser Industries, Inc., in Dallas.

The report from which this and later articles are prepared, embraces 224 pages, with five supplementary reports and a set of maps. The report has just been completed after years of data accumulation, shifting, digesting, and writing. Sets of the complete work, "Operating Requirements, Techniques, and Procedures for Prospective Oil and Gas Operators in Venezuela," are being sold to oil companies interested in entering Venezuela at $2,000 per set. Two major companies operating in Venezuela were initial subscribers.

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pany now offers dry-docking facilities, pier space, and marine repair at a terminal in Maracaibo and plans to build facilities at Las Morochas and San Lorenzo (both on eastern shores of the lake). Several other terminals along the western shore of the lake are being constructed.

Drilling contractors operating barges on contract usually furnish their own crew transportation and bids are submitted on this basis. Operational costs for large speed launches average approximately $62,000 per year per unit if company operated.

Tenders with 800-hp. draw works, two 700-hp. pumps, plus two crew boats demand a contract price from $3,750 to $4,400 per day. There are contracts presently running at $4,100 per day.

Drilling on the lake is being done by the tender-permanent foundation method. The foundations are constructed by the operating company in all cases, whether a contract or company-owned barge is used for drilling.

Transportation on the land areas in this region does not offer too difficult a problem. The rainy season prevails as in most parts of Venezuela; however, rainfall in the area amounts to only 25-35 in. and generally falls during a 6-month period from June to December. To the extreme north of Maracaibo there are a few areas where drilling is being done which have no roads, and in some instances equipment is moved by water to a point nearest the operation, then transported over newly made roads to the location. Contract transportation costs will approximate 20-25 centimos per ton-kilometer.

State of Falcon . . . The climatic conditions in the State of Falcon are very similar to those of Zulia, and in general the area is arid and rainfall is sparse. The eastern portion, however, consisting of an area approximately 200 miles square, is heavily wooded and rainfall averages approximately 30 in. per year, all of which falls in a 4-month period between December and May.

Active exploration is now being done in the central portion of this area and wells vary from total depths of 8,000 ft. in the central portion to 3,000 ft. in the western portion. Drilling is very similar to the area north of the city of Maracaibo with the one exception that no drilling is

being done presently in the granite or basement.

Transportation in the area during the dry season is not too difficult since much of it can be traversed over natural terrain. Many areas during the rainy season are impassable. Transportation costs average approximately 20 to 25 centimos per ton-kilometer.

Barinas Area

This area lies to the south of Lake Maracaibo and across the Andes from this lake. To reach it from the Maracaibo region requires the crossing of mountains, some passes of which rise to 14,000 ft. The area is drained southward to the Orinoco River and is crossed by many hundreds of streams, most of which are sizable during the rainy season. The area is quite hilly in that portion where future drilling is to be done or where new concessions have been taken. Present fields are located in very flat and low terrain, most of which is or has been confined to rice cultivation. Rainfall approximates 80 in. per year, all of which falls between the months of June and December, and in the past years drilling has been confined solely to the dry season.

Two companies presently are following an active drilling program in the area and have been drilling for some 10 years. The area promises to be one of the most active in Venezuela and possibly in the world, as evidenced by the keen interest shown by many companies in bidding for and obtaining concessions early in 1957. At the present time, four rigs are actively drilling in the area.

Total depth of present producing wells in the area average 9,800 ft. Drilling is comparatively easy and no difficulty is encountered in the first 6,000 ft. In fact, the native clays in the formation make their own mud; therefore, drilling costs are relatively inexpensive and nonhazardous. A section of approximately 2,000 ft. in all wells presently completed has been extremely hazardous to drill inasmuch as the Pauji shale predominates and careful attention must be given to mud weights, rotation speeds, and drilling weights, since this is a heaving shale and makes for considerable trouble if close attention is not given to drilling through the formation.

Contract drilling predominates in the area and at the present only one company rig is being run. This rig is generally run to gain information for the company for future drilling purposes. Contract prices average $8.85 per ft. Wells are completed in approximately 28 to 30 days, with a potential of 400 to 1,000 bbl. of oil per day.

Since the current active drilling area is of a low topographical nature, foundation and road costs run extremely high and average around $40,000 per location. These costs, especially those connected with the road-building portion, may drop inasmuch as considerable study is being given toward unitization of road-building efforts between the new companies coming into the area and the older companies operating there. Studies are under way to traverse the fields with these possible joint roads in an effort to cut costs and better the operations. Planning is also under way to build these roads of such quality that year-round operations can be practiced.

Eastern Venezuela

Maturin area—Delta Amacuro . . . Considerable drilling activity is prevalent throughout the entire Delta Amacuro area. Climatic conditions in the area are extremely bad, and in part of the area up to 200 in. per year of rainfall is experienced. The

DRILLING IN VENEZUELA comes high and wells in Lake Maracaibo are particularly expensive because of the added costs due to water operations.

Western Venezuela
MARACAIBO AREA
LAKE MARACAIBO
TYPE | T.D. FT. | COMPLETION TIME (days) | DRILLING COST (Per Day)
Development | 6,800 | 25 | $7,000
Exploratory | 7,300 | 45 | 5,000
NORTH OF MARACAIBO
Development | 10,500 | 127 | 3,000
9,000 | 60 | 3,700
Other | 3,500 | 16 | 3,850
EASTERN LAKE SHORE
Shallow | 2,800 | 6 | 5,600
4,100 | 6 | 6,450
STATE OF FALCON
Development | 3,200 | 15 | 3,150
Exploratory | 8,200 | 62 | 2,900
MARACAIBO
PUERTO CABELLO
CARACAS
Barquisimeto
Valencia
BARINAS AREA
TYPE | T.D. FT. | COMPLETION TIME (days) | DRILLING COST (Per Day)
Development | 8,000 | 32 | 5,200

area is traversed by swamps and large deep rivers, which require the use of drilling barges, some of which are submersible, and others are the tender-platform type. A few wells have been drilled on artificial floats. Dredging to the location is usually practiced in the southeastern portion of the area. Crews ordinarily live on the drilling barge or in quarters constructed on barges. Supplies both for the camp and drilling are transported in marine craft.

Drilling is extremely difficult throughout the entire area and it has been said by many that it is impossible to drill due to heaving-shale conditions in a great portion of the area. Wells, however, have been drilled to total depth throughout the entire area at great costs both in time and money, and some mud bills alone have run as high as $1,000,000 per well. The hazardous heaving shale area lies generally to the east of a line drawn direct from the city of Maturin to the Creole producing camp at Pedernales, which camp lies directly across the bay west from Trinidad.

Quiriquire-Santa Barbara . . . Many wells and numerous fields have been drilled or discovered in the Quiriquire-Santa Barbara trend and a great amount of drilling is being done on exploration wells in this immediate area.

The terrain in the Quiriquire district proper is extremely rough and location costs run very high; however, to the north and west the land is quite level, rainfall is normal, and road building and location construction costs are nominal. Rainfall in the southern portion may reach 60 in. per year, while to the north it diminishes to approximately 18 in.

Well depths vary from 1,800 ft. to well over 12,000 ft. Drilling conditions in the area generally are good and rapid progress is made on most wells. Cost for various depths and types of drilling wells is shown in the illustrations.

Barcelona Area

The Barcelona area is one of the most active areas in Venezuela. Drilling conditions, field locations, and field sizes are very similar to those in West Texas. Climatic conditions for oil-field operations throughout the region are very favorable. Rainfall occurs in a 6-month period between June and December but is quite normal, averaging somewhere around 20 in. per year.

The terrain is generally flat, covered with a loamy, sandy top soil which enables the construction of roads at a reasonable cost, and the building of locations quite cheaply.

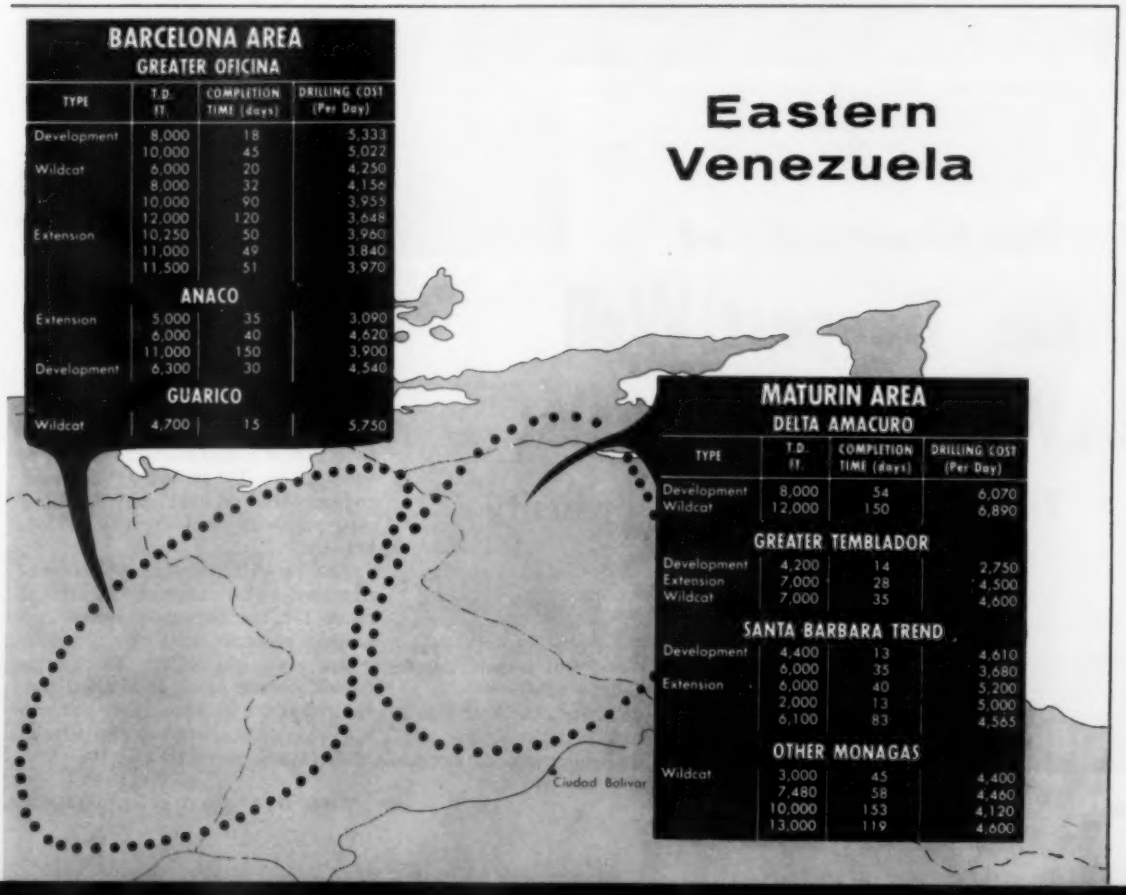
The total depths of wells range from 6,000 ft. in the southern portion of the area to 14,000 ft. toward the north.

Greater Oficina . . . Contract drilling predominates throughout the Greater Oficina area and in recent months many of the former company-owned drilling rigs have been sold to established contractors or to new ones just coming into Venezuela for the first time. Drilling prices are very competitive, and vary considerably throughout the region.

Anaco . . . Drilling activity continues at a brisk pace in Anaco area, which lies in the north central portion of the region, supervised out of the Barcelona office of the Bureau of Mines.

The wells average in total depth somewhat deeper than those in the Oficina area to the south. Contract drilling has been practiced in this area for a considerable number of years.

HEAVY RAINFALL makes for high costs in the Delta Amacuro area. Mud bills have run as high as $1,000,000 because of heaving shales.

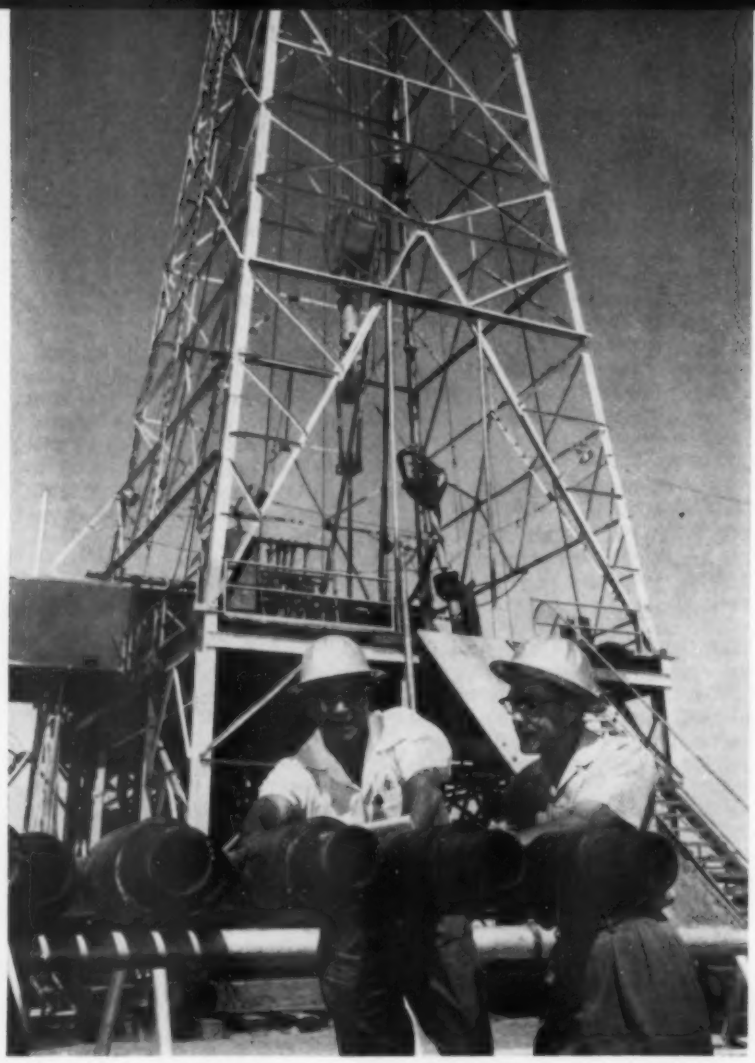


BARCELONA AREA
GREATER OFICINA

TYPE	T.D. FT.	COMPLETION TIME (days)	DRILLING COST (Per Day)
Development	8,000	18	5,333
	10,000	45	5,022
Wildcat	6,000	20	4,250
	8,000	32	4,156
	10,000	90	3,955
	12,000	120	3,648
Extension	10,250	50	3,960
	11,000	49	3,840
	11,500	51	3,970
ANACO			
Extension	5,000	35	3,090
	6,000	40	4,620
	11,000	150	3,900
Development	6,300	30	4,540
GUARICO			
Wildcat	4,700	15	5,750

MATURIN AREA
DELTA AMACURO

TYPE	T.D. FT.	COMPLETION TIME (days)	DRILLING COST (Per Day)
Development	8,000	54	6,070
Wildcat	12,000	150	6,890
GREATER TEMBLADOR			
Development	4,200	14	2,750
Extension	7,000	28	4,500
Wildcat	7,000	35	4,600
SANTA BARBARA TREND			
Development	4,400	13	4,610
	6,000	35	3,680
Extension	6,000	40	5,200
	2,000	13	5,000
	6,100	83	4,565
OTHER MONAGAS			
Wildcat	3,000	45	4,400
	7,480	58	4,460
	10,000	153	4,120
	13,000	119	4,600



VANADIUM-STEEL DRILL PIPE gave the added strength necessary for resistance to excessive torsion and binding. This drill pipe was used on the upper half of the drill string. Fred Beleau, Pan American's district superintendent, and Pat Caruthers, Pan American Yates area field superintendent, examine the drill pipe.

How Pan American drilled

Texas' Deepest Well

... World's second deepest

The story of the 1-CS University

By Ed McGhee
District Editor

AFTER IT PASSED 21,482 ft., this well became the second-deepest ever drilled. Only Richardson & Bass's 22,570-ft. Louisiana well is deeper.[1] Every foot Pan American drilled below 19,060 ft. was a new depth record for Texas.

Besides its depth, Pan American's well had singular success staying out of trouble. No fishing jobs developed

until drilling reached 21,687 ft. Moreover, there were neither losses of circulation nor uncontrolled "kicks" in the deep hole.

By careful planning and close control of operations, most trouble was sidestepped before it arose. This is the story of how the hole was drilled and some of the things the operator did to avoid trouble and keep making hole steadily.

Slated to Ellenburger . . . It was originally planned to test the Devonian and the Ellenburger in the company's 1-CS University. A well only 6 miles away had topped the Devonian at 13,900 ft. The 1-CS University had not reached the Devonian when drilling halted at 21,687 ft.

The 3,840-acre block on which the well is located cost Pan American more than $4,250,000 in June 1956. Later Gulf Oil Corp. purchased one-half interest in the block and participated in the drilling and testing costs to a depth of 18,100 ft. Although drilling cost has not been completely tabulated, it likely runs about $1,200,000.

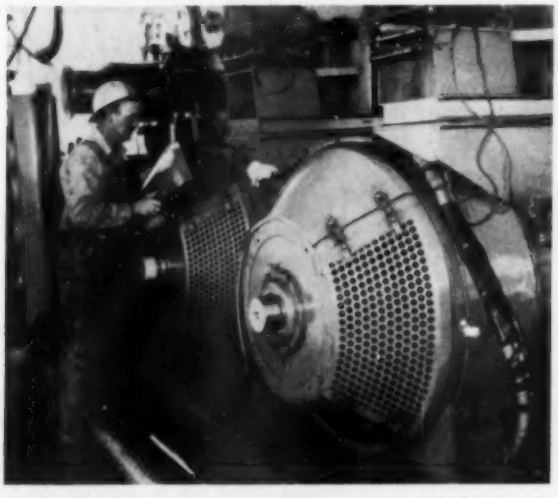
Record-breaking rig . . . Parker Drilling Co.'s Rig 26 was chosen to drill the well. This rig already had made a reputation for deep-hole, hard-rock drilling. It came to the new location from the well which had just broken the depth record for Oklahoma.

Draw works on this rig is a National 23-10½ steam unit converted to electric drive. Power comes from two 1,000-hp. V-12 Waukesha engines fueled with butane and compounded together to drive three 250-kw. d.c. generators. All commutators on these generators are silver-soldered so that their capacity is some 50 per cent above normal.

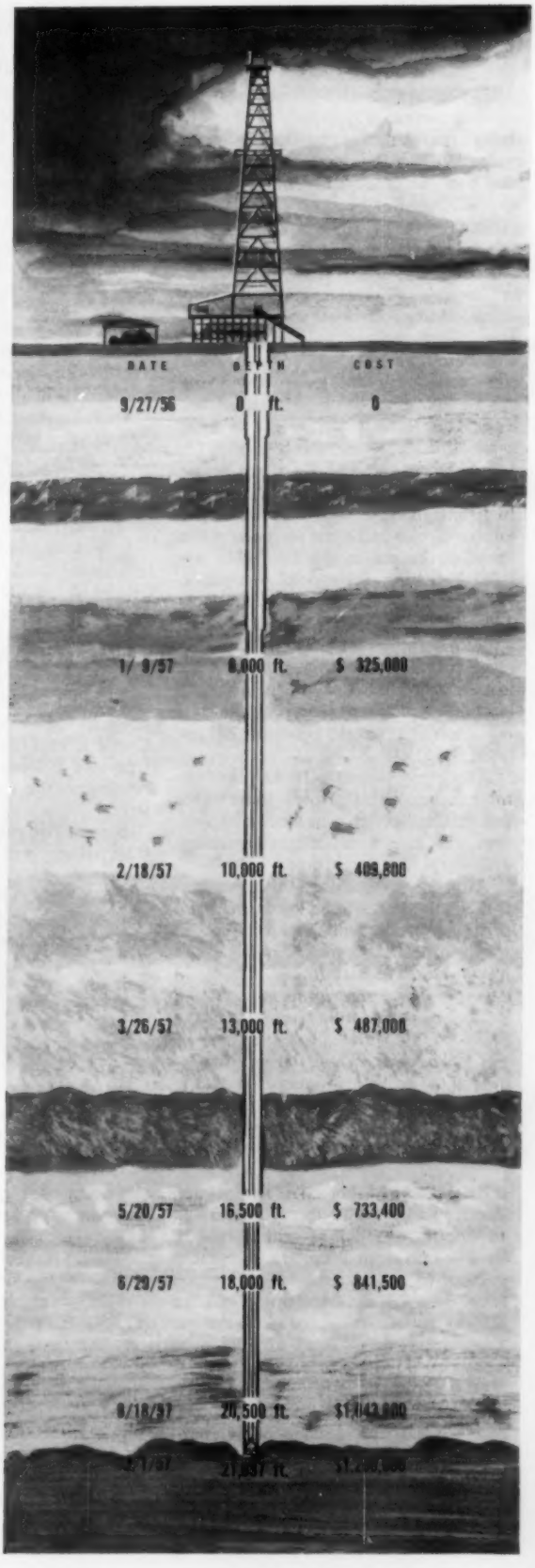
There are two 300-hp. d.c. electric motors compounded to drive the draw works. While originally there was only one National C-350 pump on this rig, most of the hole was drilled with an Oilwell 816P, driven by two 400-hp. d.c. motors. A standby National C-150 pump is independently driven by an LRO Waukesha engine. Mud system includes four steel pits with total capacity of 800 bbl.

The rig drilled from a 22-ft. substructure. This allowed plenty of room for the blowout-preventer assembly without need for a cellar where gas might collect. There were three Cameron series 1500 QRC preventers, one with blind rams and two with pipe rams; there was also a series 1500 Hydril preventer.

BOTH OPERATOR AND CONTRACTOR kept a close check on the bits to prevent costly fishing jobs. Ellis Watson, of Pan American, Abiline, and Fred Beleau examine bit No. 278.



TWO 300-HP. 200-volt motors produce 1,200 electric horsepower on the converted steam draw works. Checking over the motors is By Bird, day driller for Parker Drilling Co.



YEAR-LONG HISTORY of dates, depths, and cumulative costs of Pan American's 1-CS University, Texas' deepest well, and deepest Pan American ever drilled. (Courtesy Horizons, published by Pan American Petroleum Corp.)

"Biggest trouble in the deep hole was pulling out on trips"

Drilling Program

Rig 26 spudded 1-CS University on September 27, 1956. Table 1 shows the drilling and casing program. With a few exceptions, drilling the surface and intermediate hole was routine.

As the 16-in. surface casing was being run, it stuck at 923 ft., either because of a thick mud filter cake or because of the stiffness of the string. After oil was spotted, however, the pipe was pulled loose and retrieved. The hole was reamed, mud conditioned, and the casing run without the positive centralizers used before. This time it ran easily to total depth and was cemented.

On the second 15-in. bit run below surface pipe, a pin on the bit failed. In fishing for the bit, the bottom two joints of 16-in. surface pipe were found to be off in the hole. The resulting fishing job took 4⅔ days. As a result hole size was reduced to 14¾ in., and later to 13¾ in. Two additional joints of the 16-in. casing came off later, causing much time lost in trips. Also, a magnet had to be run to pick up pieces of the casing that fell to the bottom of the hole.

Another 1¼ days were lost on three other fishing jobs; these were due to drill-collar and drill-pipe failures, resulting from extremely rough drilling in the large hole.

After these failures, the Magnaflux method was used to inspect the drill pipe once, and the drill collars were inspected several times. Weak joints were replaced.

As an extra precaution, a hydraulic drill collar was used from 2,800 to 5,825 ft. This tool absorbed some of the bit bounce in the large 13¾-in. hole and protected against knocking off any more of the 16-in. casing. Performance of the tool was satisfactory.

High collar weights . . . The second intermediate hole from 5,825 to 16,478 ft. was drilled with 7-in.-o.d. by 2¼-in.-i.d. drill collars. Minimum number of collars used was 14, which gave a total drill-collar weight of 40,000 lb. As many as 26 of these 7-in. collars were used to give total weight of 91,000 lb.

Weights on the 9⅝-in. bits were as high as 90,000 lb. Between 10,200 and 11,800 ft., an especially hard section, bit weights averaged 80,000 lb. for 8 to 10 rotating hours. In spite of the high weight, maximum hole deviation was only 1¾°.

The hole was drilled to about 11,000 ft. with 4½-in.-o.d. 16.60-lb. Grade E drill pipe. Then operator began adding 4½-in.-o.d. 16.60-lb. vanadium pipe at the top of the string to increase tensile strength and collapse resistance. Some 4,000 ft. had been added by the time the hole reached 15,000 ft. Additional Grade E pipe was added to the bottom of the string as drilling progressed to 16,478 ft., where 7⅝-in. casing was set.

Drilling the deep hole . . . Another combination string drilled the hole below 7⅝-in. protective pipe. This was all 3½-in-o.d. pipe, the top 11,000 ft. of which was 15.50-lb. vanadium-alloy pipe. Remainder was 15.50-lb. Grade E. The pipe picked to extend depth was Grade E, and was added on bottom of the string.

It was decided that this combination string could be used as deep as 24,660 ft. while carrying the same 15,800-lb. weight on bits used in the deep hole. This depth figure would include a 100,000-lb. safety factor for working the pipe, shock loading, and other contingencies. Weakest point in the string was the top of the Grade E at 11,000 ft. Joints of pipe from the bottom of each string were rotated to the top of their respective string.

Biggest trouble in the deep hole was pulling out on trips. There was also a tendency of the string to stick while drilling. Part of the trouble was due to hole deviation. Pipe dragging off bottom caused an extra 20,000-lb. pull above drill-stem weight. Sometimes it was necessary to work the pipe to free it.

Hole deviation was:

0 to 16,478 ft—0° to 1¾°.
16,478 to 18,000 ft.—1¾° to 5°.
18,000 to 20,000 ft.—5° to 10°.
20,000 to 21,600 ft.—10° to 12°.

Obviously, the increase in hole deviation was gradual. As a result, the hole gave little trouble in forming key seats.

There was no trouble going into the hole. On one trip, however, the 6¼-in. bit hit an obstruction at 17,050 ft. and a cone was knocked off. At first, the obstruction seemed to be a bridge; but a caliper survey showed it to be a ledge. A new bit was run and it drilled on the lost cone for 2 hours. There was no attempt to recover the cone and it made no trouble later.

Near total depth, total trip time after setting back the kelly averaged 16 to 17 hours. If it had not been necessary to pull slowly through the deep shale section, the trips could have been made in 12 to 13 hours.

Unstable shale below 19,000 ft. . . After passing 19,000 ft., the 1-CS University drilled almost nothing but shale. As a result, the drillers weren't allowed to cut more than 4 ft. per hour. When penetration was faster, there was trouble in keeping the pipe and bit free.

As a result of the shale trouble, mud viscosity was raised. Extra viscosity cut the tendency of the bit to stick on bottom, but too much drove the standpipe pressure too high.

No junk baskets, stabilizers, or reamers were run in the 6¼-in. hole. Keeping the drill stem as free as possible from protruding tools reduced the danger of sticking. Stabilizers likely would not help keep hole deviation low in such a soft shale—in fact, mechanical action of a stabilizer probably could make the shale problem worse.

Before every trip in the deep hole, mud was circulated for 3 hours with the bit just off bottom. This cleared shale fragments from the lower end of the drill stem so that it was easier to pull.

Finally stopped at 21,687 . . . When the hole reached 21,687 ft., after drilling more than 2,500 ft. of almost solid, unstable shale, the bit stuck on bottom and could not be freed. The drill stem was backed off and, after 6 days of fishing, recovered to 20,100 ft.

At this point, the operator decided to make no further attempts to recover the remainder of the fish. The expense of more fishing and deeper drilling could not be justified on the remote chance that a pay zone might lie close beyond the 21,687-ft. level. And, there were no prospective pays in the interval from 20,100 to 21,687 ft., previously drilled and now covered by the fish.

For these reasons, a plug was set in the open hole above the fish. After this plug was dressed to 18,400 ft., drill-stem testing began in the open hole above.

Mud and Circulation System

Table 2 is a summary of the mud on 1-CS University. When the well spudded, a desander was put on the mud system and used almost continuously in the surface and intermediate holes. The desander used has two 8-in. cones, and carries its own six-cylinder engine and a centrifugal

Here's the drilling program on the 1-CS University

Table 1

Hole—	Interval, ft.	Hole size (in.)	Bits	Drilling and casing time (days)	Casing (in.)	Remarks
Conductor	0-70	25	...	6	22	
Surface	70-1,790	20	14 Rock	26	16	Stuck 16-in. casing at 923 ft., spotted oil, pulled loose, reran to TD.
First intermediate	1,790-5,825	15, 14¾, 13¾	52 Rock	66	10¾	Lost 6 days fishing on account one bit pin, three drill-pipe, drill-collar failures. Also lost time when four bottom joints of 16-in. casing parted.
Second intermediate	5,825-16,478	9⅞	132 Rock 1 Chert	135	7⅝	Ran six open-hole drill-stem tests.
Deep	16,478-21,687	6¼	117 Rock	161	....	Ran one drill-stem test (packer in 7⅝-in. casing. Shale below 19,000 ft. Hole deviation rose rapidly below 18,000 ft. to 12° at 21,500 ft. Fishing job at 21,687 ft. is not included.

. . . the mud program

Table 2

Depth, ft.	Hole	Mud type	Wt., lb. per gal.	Viscosity, sec. per 1,000 cc.	Water loss, cc.	Oil content per cent	Remarks
0-1,790	Surface	Low pH gel-chemical	9.0-9.5	32-40	10-50	0	Using desander.
1,790-2,200	First intermediate	Water				0	
2,200-5,825	First intermediate	Salt-water clay, starch	9.0-9.5	32-35	30-100	0	Using desander.
5,825-6,000	Second intermediate	Water				0	Using desander.
6,000-11,000	Second intermediate	Low pH gel-chemical	9.0-10.2	35-120	4-10	0	Water loss brought down to minimize wetting shales. Using desander.
11,000-16,478	Second intermediate	Low pH, gel-chemical, oil-emulsion	9.0-10.2	35-120	4-10	8-10	Oil added to raise penetration rate. Using desander.
16,478-TD	Deep	Low pH, gel-chemical, oil-emulsion	10.6-10.8	75-140	3-5	10-11	Viscosity raised to handle unstable shales. Using degasser. At 21,500 ft., est. bottom-hole temp. 336° F.

. . . the hydraulic program

Table 3

Depth, ft.	Mud viscosity, sec.	Drill pipe size, in.	Stand pipe pressure, psi.	Liner size and stroke, in.	S.P.M.	Pump	Annular velocity, ft. per min.	Hole size, in.
10,100	45	4½	1,600	6½ by 16	40	Oilwell 816P	105	9⅞
12,400	45	4½	1,700	6½ by 16	54	Oilwell 816P	139	9⅞
13,600	90	4½	1,700	5½ by 16	64	Oilwell 816P	116	9⅞
15,300	90	4½	1,700	5½ by 16	58	Oilwell 816P	*29	16
17,000	70	3½	1,700	5 by 16	30	Oilwell 816P	97	6¼
18,500	80	3½	2,000	4½ by 18	38	National C350	119	6¼
19,500	125	3½	2,300	4½ by 18	28	National C350	78	6¼
20,400	130	3½	2,700	4½ by 18	34	National C350	97	6¼
21,400	130	3½	2,800	4 by 18	53	National C350	115	6¼

*Based on calipered 16-in. hole.

. . . and the casing program

Table 4

Pipe size, in.	TD, ft.	Amt., ft.	Weight, lb./ft.	Grade	Coupling	Cement	Remarks
22	70	70	....	....	.....	Cement circulated (100 sacks).	Routine.
16	1,790	1,790	....	....	.....	Cement circulated (1,050 sacks).	Routine.
10¾	5,825	80	51	J55	ST&C	Cement circulated, 30 per cent Diacel D, 2 per cent $CaCl_2$ slurry weighing 11.6 lb. per gal. Tailed in with 300 sacks Sloset. Total 2,000 sacks.	Light slurry used because of weak zone at 5,675 ft. Slurry showed signs of too-rapid setting and circulation was partially lost.
		651	40.5	J55	ST&C		
		4,000	45.5	J55	ST&C		
		1,094	51	J55	ST&C		
7⅝	16,478	1,000	39	N80	BT	Cemented with 2,000 sacks Pozmix 140 with 1.2 per cent HR-4 retarder with no accelerator. Mixing and pumping time, 1 hr., 45 min.	Lower three joints spot welded. Maximum weight indicator reading was 485,000 lb. on account float did not work. Cement picked on assumption of 300° F. bottom-hole temp.; actually not that high. Caliper shows hole to be 16-in. diam. in spots; gage hole was 9⅞-in.
		1,000	33.7	N80	BT		
		1,127	39	N80	Triple-seal		
		5,155	33.7	N80	Triple-seal		
		2,000	33.7	N80	Exline		
		2,216	39	N80	Exline		
		1,000	39	N80	8R LT&C		
		1,800	33.7	P110	Exline		
		1,287	38.05	S95	Flush-joint		

pump. It performed well, removing a lot of sand without discarding much barite as long as viscosity was less than 75 seconds per 1,000 cc. More important, Pan American believes that the lightweight mud as maintained by the desander was the big reason there was no loss of circulation after 10¾-in. casing was set at 5,825 ft.

After the 7⅝-in. casing was set at 16,478 ft., the desander was not used as extensively because the mud had become gas-cut.

At 15,386 ft. where gas cutting started, the mud weighed 9.8 lb. per gal. Raising the weight to 10.2 lb. did not stop the cutting but the mud was not made heavier; there was too much danger that a heavier mud would cause loss of circulation.

When the 7⅝-in. string was set, a mud degasser was installed. And, although mud viscosity had to be raised, the degasser always restored the gas-cut fluid to a satisfactory condition. Because of the degasser, the operator was able to handle gas cutting without raising mud weight.

Gas cutting continued to total depth, but normally there was no lost time because of it. For 1 to 3 hours after circulating off bottom after a trip, there would usually be a moderate-to-severe gas kick.

Low pH, water loss; high viscosity . . . Throughout the drilling of the well, pH of the mud was kept between seven and nine to help preserve the shales. Moreover, below 6,000 ft. water loss was kept low to minimize wetting of the shales. Pan American is satisfied that this program helped to drill its record depth successfully.

A polyacrylate material was used for controlling water loss since it tolerates water dilution well and has high resistance to breakdown from high temperatures. On the basis of logs and drill-stem tests, bottom-hole temperature at 21,500 ft. was estimated at 336° F.

Possibly because of the mechanical action of the drill stem, the shales below 19,000 ft. were not stable. As a result, it was necessary to keep the viscosity high. With a low-viscosity mud, there was hole fill-up after trips.

Oil helps drilling, gels . . . Oil was added to the mud at 11,000 ft. Immediately afterwards, drilling rate went up 30 per cent. Much, but not all, of this higher drilling rate was due to the oil; part of the increase was likely due to a change in formation.

Besides the faster drilling, the oil made it possible to improve the mud properties themselves. Even with high viscosity, the 10-minute gel strength of the mud was never higher than 12 g.; usually it was from 6 to 8 g. Initial gels were only from 1 to 3 g. As a result of the low gels, the rig pumps could break circulation with very little more pressure than was necessary to circulate.

As a safeguard, however, it was the practice to break circulation at about 16,000 ft. inside the 7⅝-in. casing, again at 19,000 ft. just above the bad shale section, and again one or two stands off bottom.

Four-inch liners . . . Table 3 is a summary of the hydraulics program below 10,000 ft. in the 1-CS University. Any apparent incongruity between viscosity and pressure requirements in that table is a result of differences in number of drill collars, mud yield points, and the like.

It wasn't always possible to get as high annular velocity as was desired. To get these velocities in high-viscosity mud would have meant too high pressure or too great load on the mud pumps.

In the deep hole, Parker used two National C-350 pumps. One has 4-in. liners; its fluid end has a maximum working pressure of 5,000 psi. and has been tested to 8,000 psi. The other pump has 4½-in. liners and a 3,000-psi. working-pressure fluid end which was tested to 6,000 psi.

Neither the 4-in. nor 4½-in. liners and pistons are standard equipment; these parts were made on special orders. Reason for using them was to get faster pump speed for good lubrication. At first, there was doubt that the 4-in. pistons would stand up to long runs at high pressure. They stood up well, however. In the first 21 days of their operation, there was no repair to either liners or pistons. Then, only one liner was changed.

Casing Program

Table 4 is a summary of the casing program in the deep well. Conductor, surface, and first intermediate strings were mostly routine. The 16,478-ft. depth of the second intermediate string made it more of a problem. Pan American planned to continue drilling after this string was set and, perhaps, hang a liner out of it if production were found below.

To insure the strength of this string, the 7⅝-in. pipe was inspected on the racks before being run. This included visual and complete magnetic-particle inspection, and hydrostatic testing to 80 per cent of minimum yield strength. Unfortunately, this testing threw out about 50 per cent of the premium-grade casing that was available for the well. As a result, it was necessary to quickly readjust the casing-string design, making use of pipe of other grades. Final design carried a safety factor of 1.0 in collapse and 1.6 in tension. Safety factor in burst was not calculated as it was certain to be adequate.

When the 7⅝-in. was run, plans called for floating in the last 4,000 ft. However, the float did not work properly, and extra weight was thrown onto the upper section of pipe. The weight indicator recorded a maximum of 485,000 lb. The tension safety factor was apparently enough to prevent failure because of the higher stress.

Weak zones to cement . . . Cementing the 5,825 ft. of 10¾-in. casing was complicated by the fact that there was a weak zone at 5,675 ft. The formation there had taken mud when first drilled. To prevent this zone from breaking down, a slurry weighing 11.6 lb. per gal. and made up of 30 per cent diatomaceous earth with 2 per cent $CaCl_2$ was used.

The slurry appeared to begin setting up too rapidly and there was some loss of circulation before the last 100 sacks could be displaced. In spite of this, the cement did circulate and the job was tailed in with 300 sacks of slow-set cement.

There was evidence that bottom-hole temperature at 16,478 ft. was about 300° F. Although later data showed the hole didn't reach that temperature until 20,000 ft., operator had to select cement for the 7⅝-in. for that 300° F. temperature. The material chosen was a pozzalan-lime blend with 1.2 per cent sulfonate retarder and no accelerator. The cementing material was designed to keep its strength at high temperature and to be reliable in its setting time when combined with a retarder.

No effort was made to bring the cement behind the 7⅝ in. higher than 12,000 ft. because of lack of pumping time. Actual mixing and pumping time for the slurry was 1 hour and 45 minutes, and there was slight loss of returns at the end of the job. Subsequently, the cement top was logged at 13,010 ft.

References

1. McGhee, E., "How The World's Deepest Well Was Drilled," The Oil and Gas Journal, January 23, 1956, p. 82.
2. Scott, J. O., "Record-Breaking Rig Is Electric," The Oil and Gas Journal, November 4, 1957, p. 157.
3. Resen, F. L., "New Mud-Driven Drill Collar Increases Penetration in Lea County Well," The Oil and Gas Journal, July 19, 1954, p. 97.

WATER PROBLEMS dogged Muskegon Pipe Line in swamps...

AND ROAD CROSSINGS where ditch had to be dewatered.

Tough going all the way

Muskegon Pipe Line Corp. had to battle swamps, heavy timber, and walk a right-of-way tightrope through high-priced agricultural, residential, and industrial areas to build its 166-mile, 10-in. line from Griffith, Ind., to Muskegon, Mich.

By Gene Kinney

THE NORMAL WOES of construction in wet, highly developed areas were magnified many times for the builders of Muskegon Pipe Line.

It was completed the first of November by Service Pipe Line Co., the construction and operating agent for Muskegon Pipe Line Corp., which is jointly owned by Service and Aurora Gasoline Co. The pipeline delivers crude to Aurora and Naph-Sol Refining Co. plants at Muskegon which were formerly supplied by lake tanker and by rail. Lakeside Refining Co. will receive oil from the line near Covert, Mich., and initially truck it to its Kalamazoo refinery. Potential capacity of the system is 26,000 bbl. per day.

The pipeline will assure the refineries of a reliable source of different types of crude (Mid-Continent sweet, West Texas sour, and Wyoming heavy black asphalt) to which process units are geared. The uncertainties of winter tanker deliveries will be removed. The amount of crude storage required at the refineries will be reduced. And the savings will give the refineries a transportation-cost advantage they did not enjoy before.

The line will be powered at first by one station located at Lottaville, Ind., 2 miles downstream from Griffith, the terminus of Service Pipe Line's system from Wyoming and the Southwest. The station has two 500-hp. electrical-driven centrifugal outdoor pumping units. They will be operated at 1,400 psi.

The main-line pipe is .250-in. wall, 28.04 lb. per ft. X42. Almost two-thirds of the line is electric-weld pipe and the remainder is seamless. The system was hydrostatically tested with water for 60 miles and with oil the remaining length because winter weather made freezing a hazard.

Custody transfer into the line will be made by positive-displacement meters.

RIVER BANKS were protected by earth-filled bags and bags of a sand-cement mixture.

The station manifolds and piping were built and installed by Service personnel, with some aid from the line-construction contractors, Midwestern Constructors, Inc., of Tulsa. Metering facilities are housed in a three-sided steel shed. The masonry control building and foundation at Lottaville were contracted to L. C. Clark, Hammond, Ind.

Tankage was constructed by Chicago Bridge & Iron Co. One 50,000-bbl. floating-roof tank was built at Lottaville to be used in conjunction with three similar tanks already at the location. Lakeside Refining Co. is building a 55,000-bbl. tank at its takeoff point.

The originating station will be continuously manned by a single operator on each tour. A satellite booster station is planned near Coloma, Mich., when demand warrants. Delivery personnel are headquartered at the Muskegon terminus. Service crews stationed at Manhattan, Ill., will handle maintenance on the Muskegon line.

Line Construction

This project was one of the most difficult ever undertaken by the company from the standpoints of cost, acquisition, and special restrictions on right-of-way. Special problems and requirements were multiplied many times over those normally encountered in Service's operating area.

Most of the route was highly developed. The line traversed congested residential areas through northern Indiana, was on the same right-of-way with other lines for several miles, and cut through many fruit orchards, vineyards, berry patches, and truck farms. The only areas which weren't highly developed agriculturally, industrially, or residentially were swamp and timber. The normal right-of-way width of 50 ft. was restricted in some instances to 30 ft.

Terrain was generally rolling with rapid and pronounced changes in soil character from normal sandy soil with a little clay to almost solid heavy clay. A short section of heavy clay had to be double ditched with one big ditcher following the other. Sometimes the second ditcher had to back up and make another pass. About the only construction headache missing was rock.

The project was complicated by the unusual number of cased crossings, open drainage ditches, drain tile, and peat bogs. About 20 per cent of the line was through moderate to very heavy timber up to 4 ft. in diameter which required large brush gangs of 35 to 40 men working with four to six power saws.

Spread progress . . . The first of two Midwestern spreads, equipped with men and machinery about equivalent to most 20-in. spreads, started work on the north end August 10 under Superintendent M. T. Wilhite. The second, under Carl Stanley and D. L. Franklin, started September 13, working from the Griffith end. Welding was completed November 1.

Through good laying country the north spread made 1½ to 2½ miles per day with an average of 1.6 miles per day welded. The best-day welding was 16,960 ft. and the best-day coating was 18,000 ft. The pipe was cradled into the ditch, which was sloped from top to bottom to prevent sloughing in sandy and wet soil.

Swamps . . . Dynamite had to be used to blast a ditch through 1,300 ft. of swamp located 2 miles south of the Kalamazoo River in Michigan. Part of the ditch had to be dynamited twice. Mats would not support trench-

REPLACING DRAIN TILE kept crews busy.

OUTDOOR electric centrifugal pumping units were installed on concrete foundations. Masonry control building is in background.

ing equipment, and blasting was the only alternative method.

The quagmire was one big gelatinous mass into which a man could easily push a 4-in. pole to a depth of 12 ft. A pipeliner standing on a large stump could shake another 15 or 20 ft. away by jumping up and down.

The longest swamp extending 3 miles near Muskegon, was ditched by backhoes working on mats. At one time four backhoes were in service, each making 500 to 700 ft. of ditch per day. Pipe was laid by the swamp-push method with normal welding progress of 1,000 to 1,200 ft. per day. The trench, 4 ft. deep and 5 ft. wide, filled with water as it was dug. The capped pipe, which floats, was pushed both directions from welding stations, then sunk by filling with water. The longest continuous push was more than a mile and involved "rolling" the pipe around a 34° angle bend.

River and road crossings . . . Muskegon Pipe Line crosses 10 rivers. Four of them, the Muskegon, Grand, Kalamazoo, and St. Joseph rivers, are classified as navigable. Grade B .500-in. wall seamless pipe was laid at all river crossings.

Submarine trenches were dug with a suction dredge on one crossing and ¾-yd. clamshells mounted on sectional barges on others. On the 700-ft. Grand crossing, largest on the project, a 2½-yd. clamshell was used. Pipe was buried 4 ft. below the river bed except on the Grand, where the top of the pipe was laid at least 6 ft. below the river bed. Pipe was laid without bending except for sag due to pipe weight. River and stream banks were protected with earth-filled bags and bags filled with one part cement and seven parts sand.

There were 167 highway and railroad crossings which were bored and cased and 115 unimproved road crossings which were ditched. There were 375 sections laid due to roads, rivers, and swamps. Well over 2 miles of 16-in. casing pipe was installed. Cased crossings were subcontracted to Lloyd Manck, Henderson, Tex. Casing progress was very good with a maximum of seven crossings installed in 1 day. Water and quicksand interfered with this phase of construction several times. While one dewatered highway crossing was being bored, the bottom of the road bed was sucked out.

Pipe protection . . . The line was coated with a composite asphalt-base 3/32-in.-thick enamel covered with a 15-lb. asphalt-saturated felt. All coating operations were performed on the right-of-way except for 5 miles of swamp and "city work" sections which were yard-coated by the company.

A 2-mile congested section through and adjacent to Lottaville was jacketed with a 1-in. thick concrete coat to protect against mechanical damage by other construction activities.

Corrosion-control test stations were installed at 1-mile intervals (at road crossings), and at all insulated flanges, casings, and foreign pipeline crossings. Cathodic protection will be applied in the near future with rectifiers as the power source.

Muskegon personnel . . . William E. Slaughter, Jr., president of Aurora, is president of Muskegon Pipe Line. M. S. Schiller, also of Aurora, is vice president. Harris Squire of Service Pipe Line is vice president and J. R. Fredenberger, Service treasurer, is secretary-treasurer. These officers and C. W. Butler, Service operating superintendent, comprise the board of directors.

H. T. Chilton, Service maintenance superintendent, had charge of construction. E. O. Scott was project supervisor and R. E. Gaston was project engineer. J. W. McFarland, district superintendent for Service at Joliet, will supervise operation, and Howard R. Puckett is area foreman in the Missouri-Illinois division under which Muskegon will be operated.

REFINING

Cheaper power with gas turbines

Cost: $170-$200 per b.hp. in 1,000-hp. class
Dependability: Outage less than 0.25 per cent
Future: Dependent upon imaginative application of its dual function as producer of shaft power and cheap recoverable exhaust heat

By C. R. Apitz

GAS TURBINES as a form of power generation are making rapid inroads in a number of fields. These fields include industrial gas turbines for pump, compressor, and generator drives and for use as a hot gas generator for catalyst regeneration in chemical and petrochemical plants.

Not only are the number of gas-turbine installations increasing but more and more companies are exploring the possibility of further gas-turbine application.

Application techniques which can be applied in refineries for maximum profit will be suggested here.

The gas turbine has proved more economical from an installation, operation, and maintenance standpoint than other forms of power generation. Also its dependability over long periods of continuous service is at least equal to and often is superior to that of other prime movers.

Installation and Operating Costs

Gas turbines can be installed at a savings of at least 20 per cent over other power units in the mechanical-drive field.

Gas turbines of the 1,000-hp. category can be installed at a price of $170-$200 per brake-horsepower, depending upon the cycle and the auxiliaries required. As for operating costs, one major user estimates that the gas-turbine cost is about 30 per cent less than the cost of operating and maintaining a gas-engine-driven plant of the same horsepower.

Dependability of operation . . . This is taken for granted by firms presently using gas turbines in applications requiring long periods of continuous operation, such as that experienced in the refining, chemical, and petrochemical industries. There are several examples of gas-turbine installations in which the forced outages total less than 0.25 per cent of the installed hours. Most of the forced outages are due to control malfunctioning and not to the basic turbine. Overhaul time is about 5 per cent or less of the installed time. This is definitely an improvement in dependability over other forms of power. Another example is a gas-turbine-driven generator unit at the AGIP refinery in Italy. This unit has now accumulated more than 12,000 operating hours without forced shutdowns and without any maintenance expense.

Author is with Clark Brothers Co. at Houston, Texas. Paper presented at ASME petroleum mechanical engineering conference at Tulsa.

What Determines the Cost?

An analysis should be made of gas turbine design to properly evaluate the design features that go to determine these low costs.

Installation cost . . . This is a function of time and materials. Materials are saved by reduction in floor space, foundations, piping, building-strength requirements, and offsite facilities. The gas turbine has the highest power-to-weight ratio of any of the various types of prime movers. Low vibration values also reduce the foundation requirements. Since no overhead cranes are required for maintenance, the building structure can be lightweight and inexpensive. A cooling-water system and its costs are eliminated as all cooling is by air.

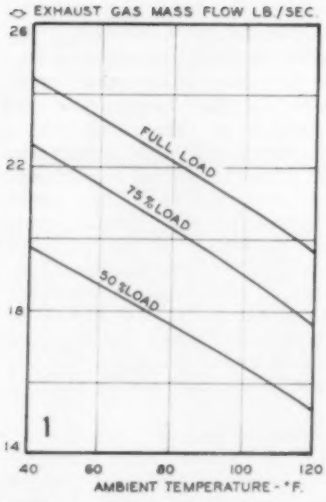
Unitization reduces time consumed in installation. This is possible by shipping the unit in self-contained units in which piping, wiring, and other details of installation are done as completely as possible at the factory. Once the main turbine unit is set and the console is set, the interconnecting lines can be run quickly.

Cost of operation . . . This is also a function of time and materials. The time required of an operator is held to a minimum by placing all controls and gages on a compact console. The unit can be started, operated, and shut down from the console by one person and the simplicity is such that several gas turbines can easily be operated by one man. Major material items for gas turbines are fuel, lube oil, and spare wearing parts. Fuel costs are in most cases higher due to the lower thermal efficiencies of the basic gas turbines but this is rapidly being overcome by design improvements for higher thermal efficiencies, new applications using waste-heat recovery, and with the fact that turbines can be operated on fuels which are unacceptable to other prime movers. Lube-oil costs for gas turbines are negligible. Spare wearing parts are a low-cost item for turbines because there are so few of them and they are subjected to a very steady loading condition.

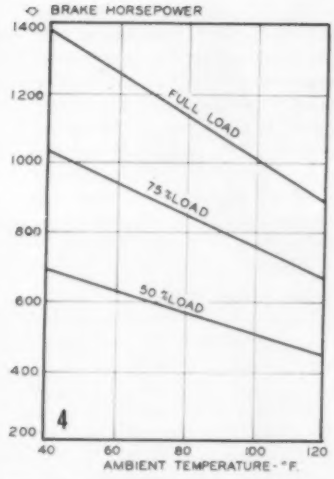
Accessibility of moving parts and high-temperature parts is a major criterion of a design when evaluating maintenance cost. This is made possible by a design including a horizontal split of the compressor case, removable interturbine duct, single combustion chamber, and the mounting of auxiliaries where they can be checked in a few minutes. All controls should be of a type which are familiar to refinery personnel, and the number of controls should be held to a minimum.

Areas of Economic Application

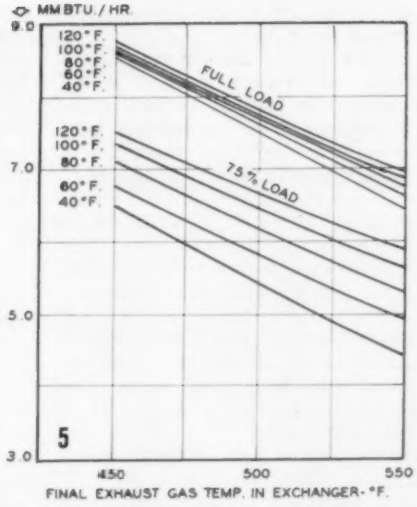
With these facts in mind, it now becomes the problem of engineers to determine the areas of economic application of gas turbines in refineries.



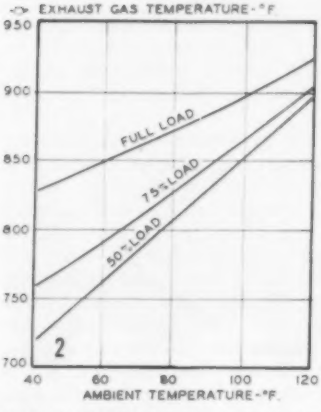
WEIGHT FLOW of gas-turbine exhaust at different ambient temperatures. Fig. 1.



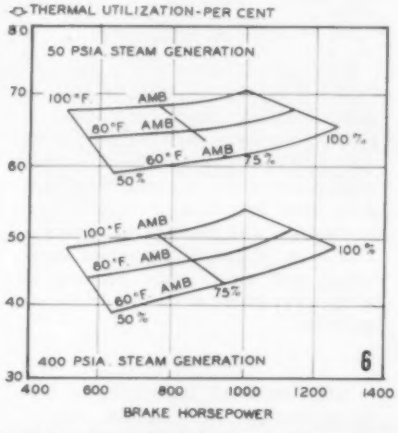
TURBINE OUTPUT horsepower at different ambient tempehatures. Fig. 4.



HEAT RECOVERED from exhaust gas by heat exchanger. Fig. 5.



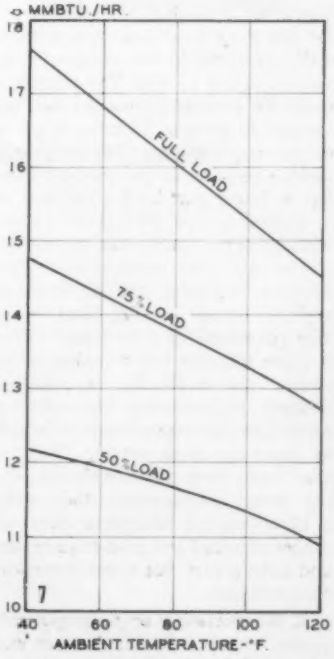
TEMPERATURE of turbine exhaust at different ambient temperatures. Fig. 2.



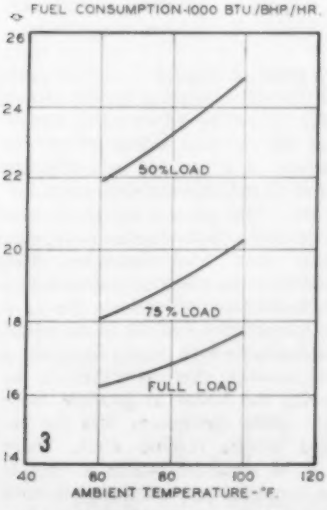
THERMAL UTILIZATION when exhaust gases are used for steam generation. Fig. 6.

Curves on Performance Data

Clark TA Gas Engines



HEAT CONTENT of exhaust gases referred to ambient air temperature. Fig. 7.



FUEL CONSUMPTION at different ambient temperatures. Fig. 3.

The analysis here presented must of necessity be based on one particular turbine model due to the availability of data and space limitations.

Every day there are millions of energy units poured into a refinery in the form of fuel. Refineries are able to use only a fraction of this energy. The engineer's job is to see how the gas turbine can be used in improving the utilization of the fuel energy.

Shaft Power and Heat Energy

The gas turbine is a producer of two forms of power. It produces shaft power and it produces economically recoverable heat energy in the form of exhaust gas. The important part of application is that we use not only the shaft power but as much of the exhaust heat as possible. With this in mind, let us consider the use of the

gas turbine for various power problems in the refinery.

There may be areas in the refinery where exhaust-heat recovery is not economically feasible. In such areas, the application of gas turbines must be evaluated from the standpoint of the thermal efficiency based only upon shaft horsepower output. Such an application will require the evaluation of various cycle variations which can possibly raise the thermal efficiency of the unit to its maximum value.

Check list . . . Before analyzing the variations in gas turbine cycles, we should establish a check list of points to consider in cycle evaluation to include the following:

1. Continuous or intermittent operation.
2. Quick-starting requirement.
3. Constant or variable load.
4. Constant or variable speed.
5. Governing requirements.
6. Space and weight limitations.
7. Availability of cooling water.
8. First cost of available cycle variations.
9. Savings in operating cost to be realized by different cycle variations.
10. Horsepower requirements.
11. Commercial availability of cycle.

Possible Variations

On the basis of the above let us evaluate the variations possible in gas turbine selection.

1. Single, double, or multiple shaft. Single or dual-shaft turbines are by far the most used and most commercially available in the range of horsepowers below 15,000. The single-shaft units are generally lower in first cost, simpler to govern, lower in space and weight requirements. The single-shaft turbine requires larger starting power, has a lower part-load efficiency and a narrow range of speed variation without considerable loss of power.

The dual-shaft turbines cost slightly more in first cost, and are in general slightly larger in size and weight. The governing of a two-shaft turbine is more difficult but commercial governors are available to meet the strictest requirements and there are several of this type of turbine installed in generator-drive service. The two-shaft units have a relatively low starting power requirement, they sustain a high thermal efficiency over wide ranges of speed and load requirements, and have a very flat speed-horsepower characteristic.

2. Regenerative or nonregenerative cycles. This is a matter that can easily be solved by factual economic data. For the turbine discussed in this paper, the regenerator will add approximately 25 per cent to the first cost plus the added installation cost of ducting and setting the regenerator. The horsepower output of the turbine is reduced 5 per cent due to ducting losses and back pressure from the regenerator. The plus side of the picture is a fuel savings of approximately 30 per cent at rated load and an even greater savings at part loads. If fuel costs are high, this is a distinct advantage.

3. Intercooling, reheat, closed cycles. These have been combined due to the fact that they have little practical significance at present in the horsepower range generally encountered in refineries. They all have the net effect of raising the thermal efficiency but the additional investment is very difficult to justify unless the fuel volumes or costs are extremely high. A very limited number of these units are in operation. There are many design problems to be overcome before they assume commercial significance.

Exhaust-Heat Recovery

For applications where exhaust-heat recovery is an economic feasibility, there are several variations to consider. Several gas turbines in this country have been purchased to operate solely with a purpose of hot-gas generation for catalyst regeneration in chemical and petrochemical plants. This is an extremely attractive application and shows great promise in many areas where steam and fuel costs are high.

Alternatives

Aside from the application of hot-gas generation there are the alternatives of recovering the thermal energy in the exhaust gas by straight heat transfer or using the hot exhaust gases as preheated air to be refired in furnaces and boilers.

Waste-heat boiler . . . First let us consider the use of heat recovery by straight heat transfer of exhaust gas. A waste-heat boiler for a turbine can be purchased at a price comparable with the cost of a regenerator and yet, the increase in thermal efficiency is considerably more with the waste-heat boiler than with a regenerator. A waste-heat boiler for this unit will increase the equipment cost approximately 30 per cent and Fig. 6 shows that the thermal utilization of the cycle is in the 40-70 per cent level depending on the final exhaust gas temperatures out of the heat exchanger. Also, an in-line combustion chamber can be installed in the duct from the turbine to the heat exchanger that will double the heat availability at an additional cost of 10 per cent.

This analysis can be easily made for any commercially available gas turbine by obtaining performance data from the vendor which includes information on the weight flow and temperature of the turbine exhaust (Fig. 1 and 2), fuel consumption (Fig. 3), and the turbine output horsepower (Fig. 4). These data permit calculation of the thermal energy that is recoverable in the waste-heat boiler (Fig. 5). When this thermal energy is added to the equivalent thermal energy of the horsepower developed, the result is the amount of energy extracted from the fuel consumed by the turbine.

Approach temperature . . . The data in Fig. 5 are based upon a temperature approach of 100°F. to the outlet temperature of the liquid being heated. If a closer approach is used there will be a greater recovery of thermal energy from the exhaust gas but the cost of the waste-heat boiler would also increase unless the assumed 8-10-in. back pressure on the turbine is increased which would result in reduced turbine shaft output.

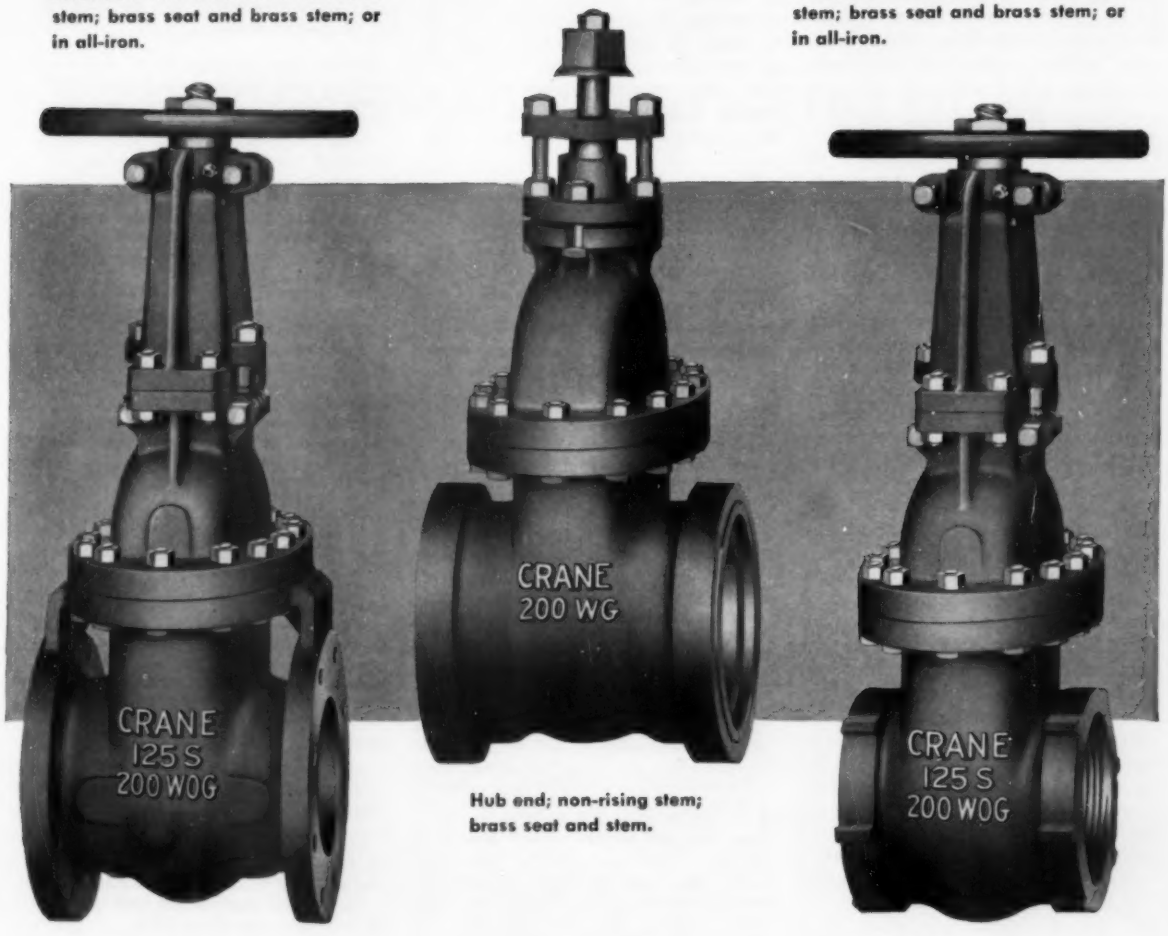
Exhaust gas temperature . . The lower the temperature of exhaust gas leaving the heat exchanger, the higher will be the thermal utilization. However, you will notice that when producing 400-psia. steam, at a relatively high exhaust gas exit temperature from the boiler, the thermal utilization is above 40 per cent when the turbine is operating at the low efficiency of a 50 per cent load and a low ambient of 60° F. The effect of lowering the turbine exhaust gas temperature leaving the exchanger is shown by the 71 per cent thermal utilization factor obtained in the production of 50-psia. steam when the turbine is operating at full load and a 100° F. ambient temperature.

Back-pressure control . . . The part-load thermal utilization factors shown in Fig. 5 can be improved to almost equal the full-load values by the installation of a variable back-pressure control on the heat-exchanger exhaust-gas exit. This control would increase the turbine back pressure as tthe turbine shaft load decreases. This would have the effect of maintaining a high mass flow of exhaust gas at a high temperature and the result would be a control which would maintain a fairly constant thermal utilization by allowing the boiler to produce more steam when the energy was not required at the turbine shaft. There would be some limitations to this. It does represent a possible application in some refinery operations.

The production of steam has been

Flanged end; outside screw and yoke. Available with brass seat and steel stem; brass seat and brass stem; or in all-iron.

Screwed end; outside screw and yoke. Available with brass seat and steel stem; brass seat and brass stem; or in all-iron.



Hub end; non-rising stem; brass seat and stem.

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the main topic of the above discussion; however, the gas-turbine exhaust can be used in many various applications such as reboilers, boiler feed, water heaters, and crude stabilizers to mention a few.

Refiring Turbine Exhaust Gas

Now we go to the second form of gas-turbine exhaust-heat recovery, in which the gas turbine is used essentially as an air preheater for a boiler or a fired heater. The exhaust gas of a turbine contains approximately 16 per cent oxygen. This is due to the fact that the limitation in maximum temperature in a gas turbine is such that the gas turbine requires a tremendous amount of cooling air to keep the temperatures in the combustion chamber and the first expander stages from reaching too high a value.

Cost factors . . These exhaust gases can be refired in a boiler without any undue problems of boiler or boiler-burner design. The capital cost, considering the gas turbine and the boiler for refiring the exhaust gases, is increased by approximately 75-80 per cent of the base turbine cost; however, it should be pointed out that the thermal utilization of this cycle is increased to 90-95 per cent depending upon thermal radiation losses in the ducting. Again an economic evaluation would have to be made counting the value of the heat recovered from the system as compared to the extra capital investment. When you consider that the gas-turbine exhaust gases, can be refired, enter the boiler at a temperature of aproximately 850°, you will see that the gas turbines can be credited with a fuel savings equivalent to the difference in heat content of the gas between the turbine exhaust temperature and the ambient-air temperature. These quantities are shown in Fig. 7 for the turbine being studied.

Conclusion

There are definite areas in refinery operations where the use of gas turbines is a definite economic advantage. More and more of these areas will be defined in next few years as the use of gas turbines increases.

- As more turbines are used, engineers will see the advantages of the turbine and think of additional applications in which they would be a definite advantage.
- The future of gas-turbine application in the process industries is dependent upon the imaginative application of its dual function as a producer of shaft power and economically recoverable exhaust heat.
- The manufacturers of gas turbines will also in the future attempt to develop new designs and revisions of existing designs which will tend to increase the economic advantage of the gas turbine. These innovations will take form of revisions in design to further reduce the costs of installation, operation and maintenance. **End.**

BOOKS

HEAT TRANSFER AND FLUID MECHANICS INSTITUTE. Held at California Institute of Technology, Pasadena, Calif, 1957. Published by Stanford University Press, Stanford, Calif. 439 pp. $7.50.

This is the tenth of a series initiated in 1948 on advanced fundamental research in heat transfer and fluid mechanics. Sponsors include American Institute of Chemical Engineers, American Society of Mechanical Engineers, and a number of California universities. The present volume is concerned largely with aerodynamic fluid-flow studies.

ORGANIC SYNTHESIS, VOL. 37. J. Casen, editor. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York, New York. 109 pp. $4.

This is a continuation of the Wiley Synthesis series in which procedures for preparation of specific organic compounds are outlined. Full details of all manipulations are described and the range of yields is reported for each compound. Melting-point ranges, boiling-point ranges, and refractive indexes are included.

INDUSTRIAL CHEMICALS, Second Edition. By W. L. Faith, D. B. Keyes, and R. L. Clark. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. $10.

This book now includes a total of 141 major industrial chemicals, from acetaldehyde to zinc oxide. Many petrochemicals are included. For each chemical, a simple box flow diagram is presented, description of the process, and material and energy requirements in its manufacture. Alternate methods of making the chemical are given. The use pattern, charts showing production and price fluctuations and a discussion covering economic aspects are included. Thus, for each chemical a thumbnail sketch is provided which constitutes a valuable reference for the given chemical.

CATALYSIS IN PRACTICE. Edited by C. H. Collier. Published by Reinhold Publishing Corp., 430 Park Avenue, New York 22. 153 pp. $3.95.

Based on papers presented at a meeting sponsored jointly by the Philadelphia-Wilmington section of the AICE, and the school of chemical engineering of the University of Pennsylvania, this book is directed at the practical aspects of chemical catalysis likely to be of use to young practicing chemical engineers.

The content of the book is limited to existing technology within the chemical and petroleum industries.

Beginning with the selection of a suitable catalyst for a proposed process, the book goes on to tell how to prepare a chemical catalyst, presents practical engineering aspects of fixed and moving bed systems, discusses the economics of catalytic processes, and ends with a prediction of the future from the trends now apparent.

THE METAL RESOURCES OF NEW MEXICO AND THEIR ECONOMIC FEATURES THROUGH 1954, by Eugene Carter Anderson. Published by New Mexico Institute of Mining and Technology, Campus Station, Socorro, N. M.

Information of particular value to those interested in developing and working the metalliferous deposits of New Mexico has been assembled for this bulletin. Brief descriptions are given of all known deposits in the state other than those of iron and manganese.

NETHERLANDS OIL EQUIPMENT MANUFACTURERS' CATALOG, 1957 EDITION. Published by Mouton & Co., Ltd., The Hague, Netherlands. 284 pages.

This catalog lists Netherlands-made oil equipment, using illustrations to show use and desirable features of the equipment.

The last 15 pages of the book make up an exhaustive conversion table.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

Nelson Refinery Construction Index

Appears in the Engineering Section in the first issue each month.

Compiled by W. L. Nelson, Petroleum Refinery Consultant, Tulsa.

The Index was explained October 1, 1956 (page 110), as well as the Indexes of Individual Items of Equipment that appear on the COSTimating page in the first issue of the months of January, April, July, and October.

Index (1946 = 100)

	1949	1952	1954	1955	1956	Oct. 1957
Pumps, compressors, etc.	135.9	155.6	166.5	172.2	192.0	208.5
Electrical machinery	130.9	152.4	160.0	162.5	175.0	190.9
Internal-combustion engines	124.8	146.5	150.5	153.2	164.0	175.6
Instruments	123.1	146.2	154.6	162.9	182.1	186.2
Heat exchangers	133.0	165.8	171.7	156.8	190.7	203.4
Miscellaneous equipment average	*121.6	153.3	160.7	161.5	180.5	192.9
Materials component	143.6	164.3	174.6	176.1	190.4	203.4
Labor component	137.1	163.1	183.3	189.6	198.2	213.1
Nelson construction index	139.7	163.6	179.8	184.2	195.3	209.2

*Used in computing the Nelson Index until April 1952. This is slightly different from the average of the Miscellaneous Equipment Items shown above.

Vapor pressure trending upward

Definite patterns are emerging in marketing of high-v.p. fuels

By T. W. Legatski, O. C. Bridgeman, and E. W. Aldrich, Phillips Petroleum Co.

APPLYING CORRECTIONS for the differences in ambient conditions, a study of survey data indicates these patterns for today's motor fuels: (1) A strong upward trend in vapor-pressure level; (2) the preponderance of high-vapor-pressure fuels is greatest in the premium grade; and (3) most high-vapor-pressure fuels are marketed by large oil companies.

Vapor pressures up . . . A study of motor-fuel survey data over the past several years indicates a definite upward trend in the vapor-pressure levels of commercial motor fuels at any given season. In large measure, this has been a consequence of economic and octane-number considerations, with every indication that these considerations will become of increasingly greater importance as octane numbers rise. It can be concluded, therefore, that there will continue to be an upward trend in vapor-pressure levels in the foreseeable future.

The magnitude of this trend is of considerable interest both to the automotive and the petroleum industries. It establishes the minimum level of performance in new car models which is acceptable as regards freedom from vapor lock. It also assists the petroleum refiner to plan ahead in his attempt to satisfy the upward trend in octane-number requirements resulting from the steadily increasing compression ratios of new model engines. From both standpoints, accordingly, there is major interest in current vapor-pressure levels of motor fuels and in the magnitude of their upward trend.

The traditional method of evaluating vapor-pressure level at any given season of the year is to obtain the arithmetic average of Reid-vapor-pressure values on commercial motor fuels marketed in broad areas, or even nationally. This will only lead to valid conclusions as regards trends, provided there is uniformity from year to year in time of sampling at each sampling location, and uniformity in number of competitive samples obtained at each locality.

Even if these conditions are met, which is not usual, the method of arithmetic averaging is fallacious as regards vapor-locking tendency, and it is this latter consideration which is the basic reason for interest in vapor-pressure levels. It has long been recognized that there is little significance in averaging vapor-pressure values over two or more seasons, since it is customary to make seasonal changes in vapor-pressure levels as the result of changes in ambient-temperature conditions. It has also been customary for many oil companies to vary vapor-pressure limits to correspond with differences in ambient temperature and altitude in different localities at the same season of the year for a uniform degree of freedom from vapor lock.

In all such cases, arithmetic averaging of R.v.p. values has little significance as regards vapor-locking tendency, and a valid comparison can only be made if correction is applied for differences in ambient conditions. Still further, it has been recognized that R.v.p. per se does not adequately predict vapor-locking tendency, and it is necessary to employ some fuel modifying factor such as the 10 per cent point slope, for example.

Hence, for maximum significance, vapor-pressure averaging should be done on the basis of vapor-locking tendency, or some factor related thereto.

New correlation . . . One method of accomplishing this objective has recently been developed. The method permits the assignment of a single R_V number to each fuel, so fuels with equal R_V values will have comparable vapor-locking tendency irrespective of ambient temperature, altitude, or specific fuel characteristics. A chart for the evaluation of R_V has been made available from which the R_V values of commercial fuels can be obtained, based on knowledge of the ambient conditions under which they are marketed.[1]

In effect, the R_V value is the R.v.p. of a fuel having a 10 per cent point slope of 2.0, which when marketed at sea-level altitude and 100° F. ambient temperature would have comparable vapor-locking tendency to the given commercial fuel marketed under its own ambient conditions.

Employing the equations underlying this isovapor-lock chart, values of R_V have been computed for the 8,753 fuels covered by the Ethyl Corp. motor-fuel-volatility surveys for spring, summer and fall of 1955, for the four quarters of 1956, and for the first three quarters of 1957.

The spring season is traditionally the one of most concern as regards vapor lock, and the percentage distribution of R_V values is shown in Fig. 1 for the springs of 1955, 1956, and 1957. The upward trend is obvious, and in spring 1957 over 69 per cent of the 933 fuels sampled had R_V values of 9 or above, and over 30 per cent had R_V values of 10 or above. The sampling months for spring 1955 were March, April, and May, whereas those for 1956 and 1957 were April, May, and June.

While use of R_V numbers tends to eliminate the effect of ambient temperature, it cannot take into account lag in marketing practices as regards changes in seasonal grades, as will be discussed in more detail later. The smaller difference between the springs of 1955 and 1956 may be realistic, therefore, or it may be due in part to the difference in sampling months, namely the substitution of June in 1956 for March in 1955.

In contrast, this substitution of months resulted in an unrealistic decrease in arithmetic average value of R.v.p. when comparing the data in the 1955 and 1956 spring surveys.

Winter carryover . . . Part of the reason for the high percentage of high-level R_V values in the spring season is undoubtedly due to some carryover of winter fuels. For comparison, the survey data for the summer season are summarized in Fig. 2. They show the same general upward trend between 1955 and 1957, with the latter indicating 56 per cent with

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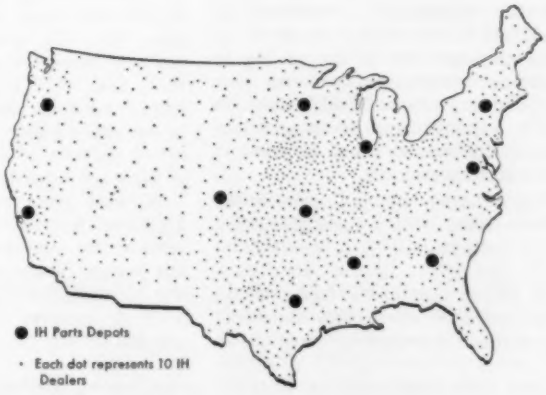

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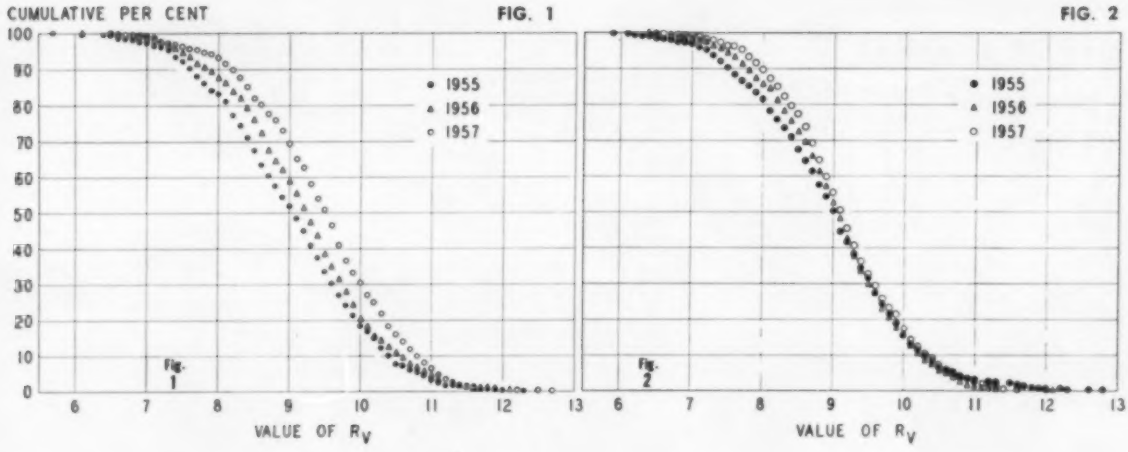


Distribution of R_V values for spring . . . and for the summer season

R_V values of 9 or above, and almost 18 per cent with R_V values of 10 or above.

These levels are considerably lower than for the spring season, indicating that many refiners have not fully developed suitable methods for translating satisfactory spring experience into terms of the higher ambient temperatures in summer. The R_V values for the fall season show a somewhat reverse trend between 1955 and 1956, due in part to the difference in sampling months in the 2 years.

Further, there is a high preponderance of low R_V values, with the result that only about 12 per cent of the fuels had R_V values of 9 or above. In large measure this is due to lag in changing seasonal grades, and particularly to practical difficulties in raising vapor-pressure levels at a rate comparable to the rapid decrease in ambient temperatures.

The situation changes again in the winter season, with a marked upward trend between the first quarters of 1956 and 1957. In the latter case, over 35 per cent of the fuels had R_V values of 9 or above, and almost 11 per cent had R_V values of 10 or above. Values for the various seasons are compared in Table 1.

Vapor-pressure analysis . . . It is apparent, then, that there is currently a marked upward trend in vapor-pressure levels of commercial motor fuels. Much of this trend is in the intermediate vapor-pressure levels corresponding to R_V values from 8 to 10. The number of very high R_V values of 12 or higher is small, but has remained essentially unchanged over the period covered by the surveys.

A very interesting point developed by use of the R_V system is the clear-cut demonstration of the lag which occurs with many refiners in keeping pace with the seasonal changes in ambient temperature. It is clearly evident, also, that many refiners have lacked adequate methods for translating vapor-pressure levels from one set of ambient conditions to another, at constant vapor-locking tendency.

A third point of interest is that high-level R_V values are more prevalent in the premium grade than in the regular grade of motor fuel. In the 10 motor-fuel surveys from spring 1955 to summer 1957, inclusive, 56 per cent of the fuels having R_V values of 10 or above were premium fuels and 44 per cent were regular fuels. For R_V of 11 or above a similar situation exists, with 55 per cent of the fuels being of premium grade.

Further, the majority of the fuels having R_V values of 10 or above are marketed by large oil companies. This is evidenced by the fact that many companies had examples of high R_V values occurring in five or more localities sampled in the Ethyl Corp. surveys. A considerable number of companies had such examples occurring in 10 or more localities sampled. The information is summarized in the accompanying table, where the last column indicates the percentage of all survey fuels with R_V of 10 or above marketed by the indicated number of companies for the three survey years.

A. Five or More Sampling Localities

Year	No. of companies	Per cent of high R_V fuels
1955	11	52
1956	13	59
1957	20	71

B. Ten or More Sampling Localities

1955	4	27
1956	6	35
1957	9	49

It is seen, therefore, that analysis of vapor-pressure trends leads to much more significant conclusions when made on the basis of vapor-locking tendency, as indicated by R_V numbers. Other features of engine performance should be cable of analogous treatment, and thereby greatly enhance the over-all value of motor-fuel survey data.

TABLE 1—PERCENTAGE OF VALUES AT OR ABOVE THE STATED R_V LEVELS

Season—	$R_V = 9$	$R_V = 10$	$R_V = 11$
Spring 1955*	52.0	18.5	3.2
Second quarter 1956	58.8	20.2	4.7
Second quarter 1957	69.6	30.4	6.6
Summer 1955†	50.0	15.9	3.0
Third quarter 1956	52.5	15.7	1.4
Third quarter 1957	56.0	17.6	2.4
Fall 1955‡	14.5	2.2	0.1
Fourth quarter 1956	11.8	1.5	0.2
First quarter 1956	30.2	10.1	1.5
First quarter 1957	35.5	10.6	2.7

*March, April, and May. †June, July, and August. ‡September, October, and November.

Reference

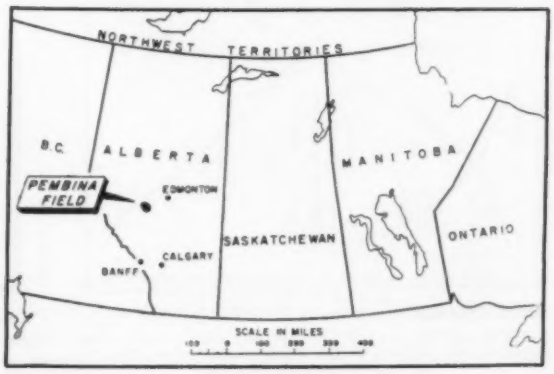
1. An Isovapor-Lock Chart, by T. W. Legatski and O. C. Bridgeman, The Oil and Gas Journal, Oct. 21, 1957, p. 110.

EXPLORATION

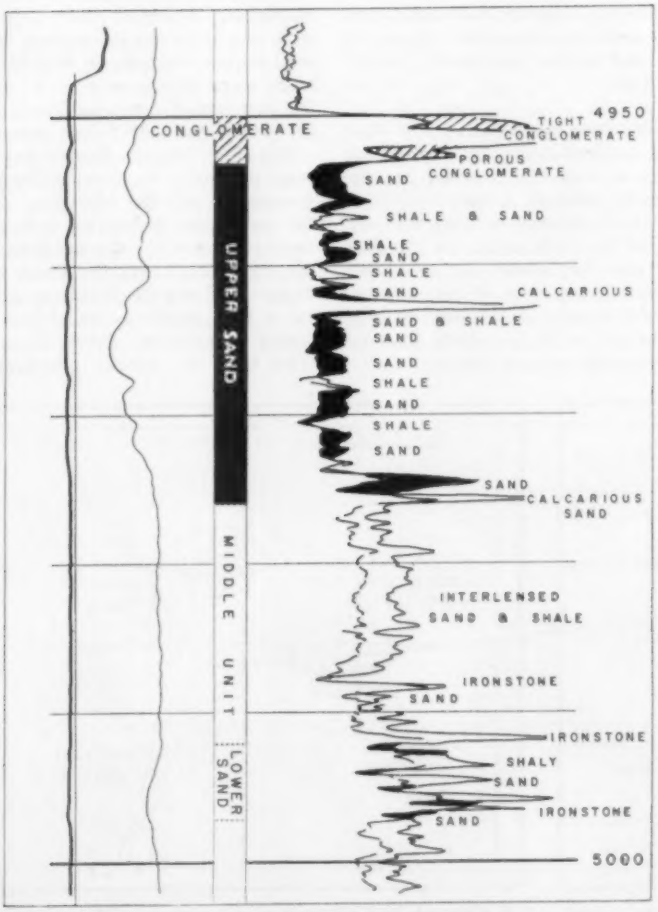
Reservoir Parameters from the gamma-ray log, Cardium sand, Pembina field

The gamma ray-MicroLog combination determines net pay in the Pembina pay zone accurately and can replace core analysis data. With this technique, considerable money was saved on field wells by eliminating unnecessary coring.

By T. P. Cutmore



PAY ZONE in sprawling Pembina field is the Cardium sand. Fig. 1.



ALTHOUGH THE CARDIUM ZONE is 50 ft. thick at Pembina, the main pay zone, the upper sand, varies in thickness from zero to 25 ft. Fig. 2.

WEIGHTED average porosity data, dimensionless capacity, and permeability distribution curves can be determined in the Cardium sand, Pembina field, using gamma ray-MicroLog combination. These data can replace core analysis, reducing the amount of coring needed for reservoir evaluation.

The method for determining porosity is similar to the method presented in the paper entitled "Pembina-Radiation Logging."[1] However, the accuracy of the results are improved by substituting the MicroLog for the neutron curve.

Capacity and permeability distribution curves* are constructed from gamma-ray data and compared with core analysis data using the method described in Stiles[2] paper.

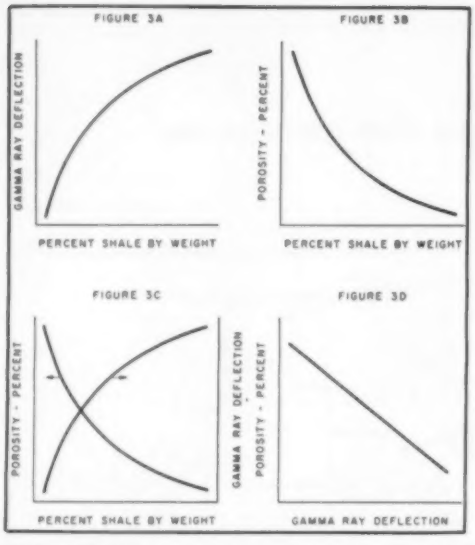
Geological description . . . The Cardium formation in Pembina field (Fig. 1), within the Colorado group, is lithologically divided into five units (Fig. 2); in descending order they are the upper shale, conglomerate, the upper sand, the middle unit, and the lower sand.[3] This paper is concerned with the lower four units.

The conglomerate varies in thickness up to 30 ft. and overlies the upper sand in some sectors. Where the matrix has not completely infilled,

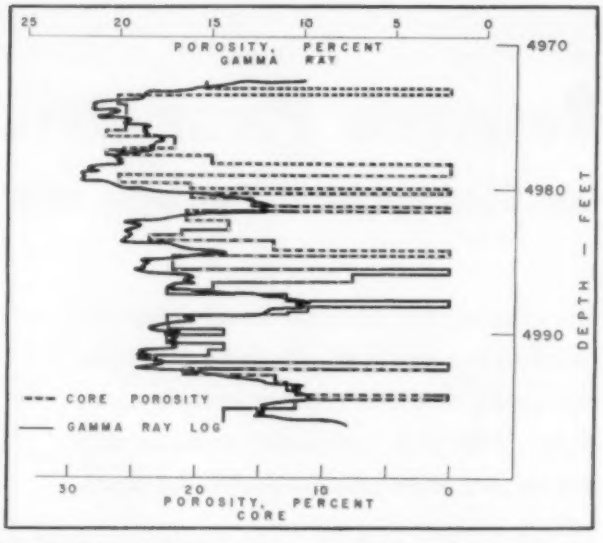
*Capacity and permeability-distribution curves throughout the article will refer to dimensionless capacity and permeability distribution curves.

Author is with Mobil Oil of Canada, Ltd.

Paper presented at Formation Evaluation, sponsored by Canadian Well Logging Society, Calgary, Alta.



SINCE CHANGE in porosity is a function of shale content, porosity can be determined from the gamma ray deflection (lower right diagram). Fig. 3.



CALCULATED POROSITIES compare reasonably well with core data in this well. Fig. 4.

the conglomerate permeability is high. The porosity, however, is low, and due to the limited areal extent of the thick porous zones, the conglomerate is not considered important in the over-all reservoir picture.

The main reservoir is the upper sand. It varies in thickness from zero to 25 ft. This fine to very fine grain sand is generally clean and well sorted. It is, however, broken by shale bands, laminated sand and shale, interlensed sand and shale, and ironstone. The average porosity is 18 per cent.

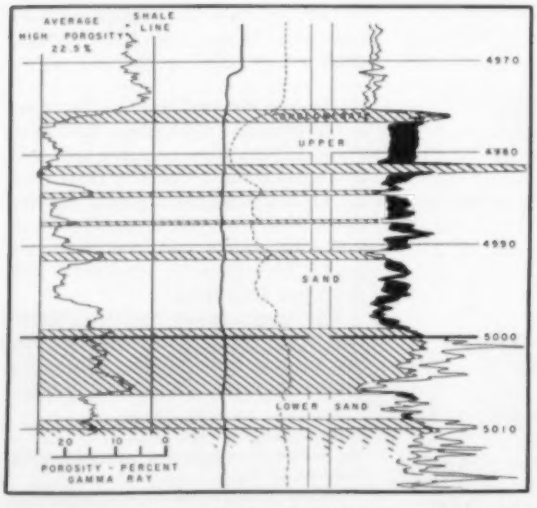
Underlying the upper sand is a nonproductive section of interlensed sand and shale called the middle unit. This zone varies from 3 to 20 ft. thick.

The lower sand underlies the middle unit and is very similar in texture to the upper sand. It has a higher argillaceous content but does not differ in lithology from the main sand. The lower sand has an average net pay of 3 ft. and an average porosity of 12 per cent.

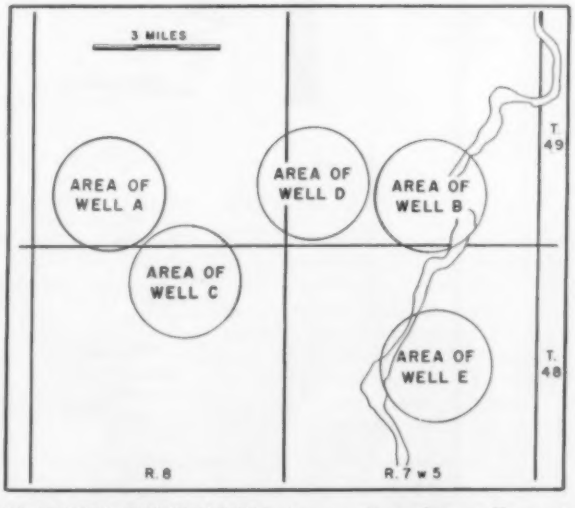
Porosity determination . . . The shale count method using the gamma-ray log is an empirical method for determining average porosity (Figs. 3 and 4). It assumes that the radioactivity of the shale above the Cardium sand and throughout the sand does not vary extensively. It also assumes that the change in porosity is more a function of shale content than cementation or grain sorting.[1]

Fig. 5 shows a gamma ray-MicroLog combination. This logging combination was run on five wells located throughout Pembina field (Fig. 6), with two different instruments being used in separate runs on Well E. The holes were drilled with a 9-in. bit, the pay section cored to 7⅞ in. and the wells cased with 5½-in. casing.

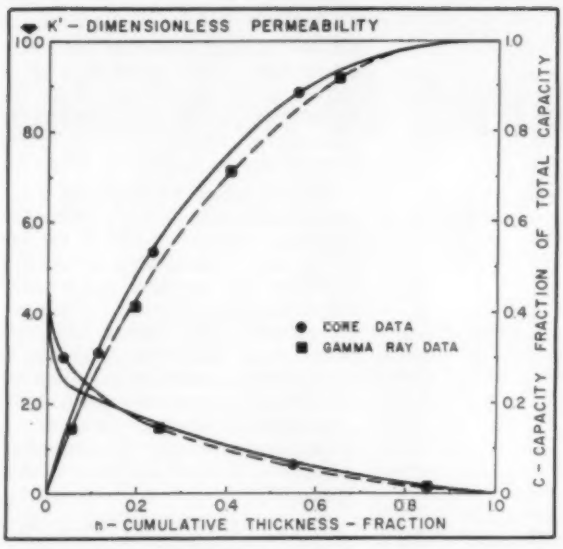
The first step in determining average porosity is to correlate the gamma-ray log with the MicroLog. Next, the pay zone is broken down into three parts, namely, the conglomerate, the upper sand, and the lower sand. Tight conglomerate is distinguishable by a high resistivity of the microcurves immediately above the upper sand (Fig. 2). Porous conglomerate



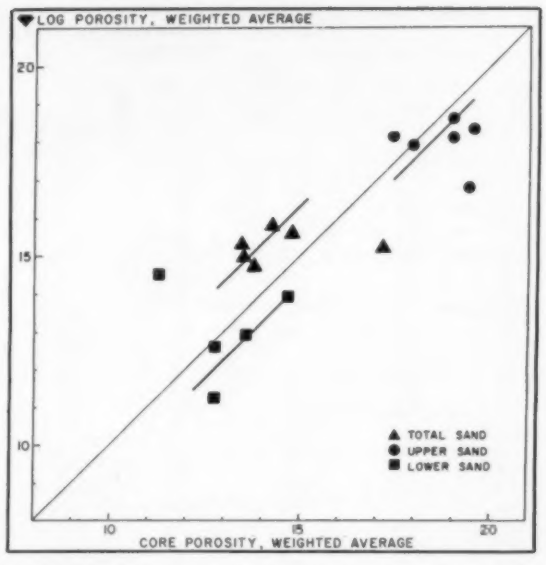
HERE is a gamma ray-MicroLog combination with the calculated porosity data. Notice the relatively thin net pay thickness. Fig. 5.



THE GAMMA RAY-MICROLOG data on these five wells were checked against actual core data. The calculated results were in agreement with core analysis within practical limits. Fig. 6


K' – DIMENSIONLESS PERMEABILITY
C – CAPACITY FRACTION OF TOTAL CAPACITY
n – CUMULATIVE THICKNESS – FRACTION
CORE DATA
GAMMA RAY DATA

HERE AGAIN the calculated data are in good agreement with the core data on Well A. Fig. 7.



GRAPH SHOWS that the calculated values from the gamma ray-MicroLog are accurate within 1½ per cent of the core values for the entire Cardium section. Fig. 9.

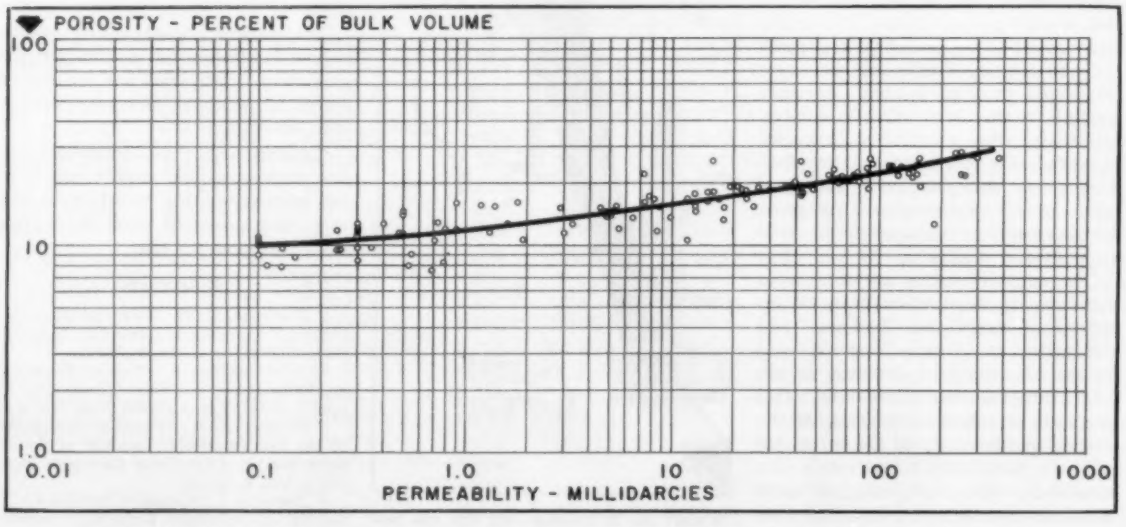
like porous sand is indicated by positive separation of the microcurves but with a shift to higher resistivity (Fig. 2). This is explained by the lower porosity encountered in the conglomerate. The conglomerate zone does not enter into the calculations and is therefore excluded from the gamma-ray curve (Fig. 5).

The next step is to establish a "shale line" which represents zero effective porosity. This is done by drawing a line through the Cardium sand on the gamma-ray log which represents the maximum radioactivity encountered in the Colorado shale above the sand (Fig. 5).

The "sand line" is drawn on the gamma-ray log coinciding with the minimum radioactivity where the MicroLog indicates a thick clean section of sand (Fig. 5). To this "sand line" is given a porosity value called the average high porosity. The average high porosity is determined from core-analysis data, in the immediate area of the well in question, by averaging the high porosities of the clean sand. This assumes that a clean section of sand, in the well in question, should have an average porosity equivalent to the average high porosity of the wells in the same area.

The interval between the "shale line" and the "sand line" can be divided into an equal number of parts, depending on average high porosity.

The weighted average porosity is determined by taking the ratio of the planimetered area between the gamma-ray curve and the shale line to the planimetered area between the sand line and the shale line, and multiplying this value by the average high porosity. In the case where a sand has been divided into several rectangles by eliminating impervious sections (Fig. 5), the sum of the areas are added together before taking the ratio and multiplying by the average high porosity.



IT IS POSSIBLE to relate gamma-ray porosity to permeability as shown in the above graph. Fig. 8.

TABLE 1—CALCULATION OF CAPACITY DISTRIBUTION, WELL A CARDIUM SAND—PEMBINA FIELD
Core Data

Thick. (ft.)	Cum. thick. (ft.)	h —frac. of cum. thick.	—K—perm.— md.	Kh	Δ C—inc. of tot. cap.	C—cum. cap. (fract.)
0.3	0.3	.014	252	75.6	.057	.057
0.2	0.5	.024	252	50.4	.038	.095
1.0	1.5	.072	159	159.0	.120	.215
0.5	2.0	.096	159	79.5	.060	.275
0.3	2.3	.110	159	47.7	.036	.311
0.7	3.0	.144	149	104.3	.079	.390
0.6	3.6	.173	141	84.6	.064	.454
0.8	4.4	.212	91	72.8	.055	.509
0.4	4.8	.231	88	35.2	.026	.535
0.6	5.4	.260	83	49.8	.038	.573
0.6	6.0	.288	83	49.8	.038	.611
1.3	7.3	.351	77	100.1	.075	.686
0.2	7.5	.361	77	15.0	.011	.697
0.9	8.4	.404	76	68.4	.052	.749
1.1	9.5	.457	73	80.3	.060	.809
0.4	9.9	.476	73	29.2	.022	.831
0.3	10.2	.490	73	21.9	.016	.847
0.8	11.0	.529	42	33.6	.025	.872
0.5	11.5	.553	42	21.0	.016	.888
0.6	12.1	.582	39	23.4	.018	.906
0.3	12.4	.596	39	11.7	.009	.915
0.2	12.6	.606	39	7.8	.006	.921
0.6	13.2	.635	30	18.0	.014	.935
0.8	14.0	.673	23	18.4	.014	.949
0.8	14.8	.712	18	14.4	.011	.960
0.6	15.4	.740	18	10.8	.008	.968
0.2	15.6	.750	18	3.6	.003	.971
0.3	15.9	.764	15.9	4.8	.004	.975
0.9	16.8	.808	15	13.5	.010	.985
0.4	17.2	.827	15	6.0	.004	.989
0.3	17.5	.841	15	4.5	.003	.992
0.6	18.1	.870	9.8	5.9	.004	.996
0.9	19.0	.914	4.6	4.1	.003	.999
0.2	19.2	.923	1.3	0.3	.0002	.9992
0.7	19.9	.957	0.9	0.6	.0004	.9996
0.5	20.4	.981	0.9	0.5	.0003	.9999
0.4	20.8	1.000	0.7	0.3	.0002	1.0000
				1,326.8		

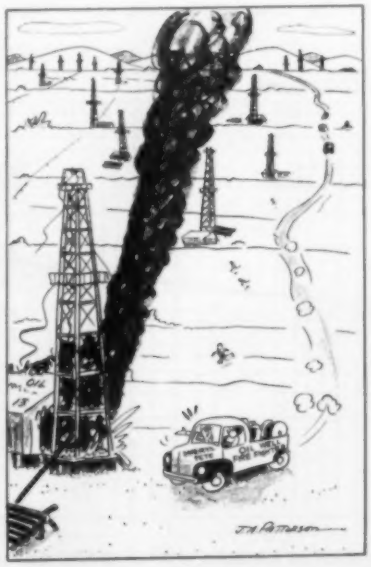
Weighted average permeability = 63.8 md.

Capacity and permeability distribution curves . . . Stiles[2] states that, in a single-phase system, fluid will flow through a permeable medium in proportion to the permeability of the medium. Thus, a water front follows individual permeability variations from input well to production well. While this is not rigorously true, this results in a simplified mathematical approach.

The capacity-distribution curve is illustrated in Fig. 7 using the core analysis on the Well A. It is a tabulation of the cumulative capacity (starting with the highest permeabilities) versus the cumulative thickness. The capacity and thickness are given as dimensionless fractions of the total capacity and thickness.

The capacity values are read from the capacity distribution curve at intervals of cumulative thickness, and the increments of capacity are divided by the increments of thickness to obtain a dimensionless permeability. This is a ratio of actual permeability to the average permeability of the formation and is a convenient way to state permeabilities when comparing different distribution curves. A plot of this data is also shown on Fig. 7.

A method has been devised whereby it is possible to obtain Stiles' capacity and permeability curves from gamma-ray data. This method utilizes the permeability porosity relationship for the Cardium sand that was established from core-analysis data (Fig. 8).[4] Thus it is possible to relate the gamma-ray porosity to permeability and use the permeability data in the same manner as outlined by Stiles.



"I can't see its number—but this one certainly meets th' description."

The procedure for obtaining a capacity-distribution curve from the gamma-ray log is to start at the top of the sand and tabulate increments of the net pay thickness, and porosity values read directly from the gamma-ray porosity scale. Next, a tabulation of the same increment thicknesses is made with permeability values that are related to the porosity values. The permeability values are read from Fig. 8 and are arranged in descending value as in Table 1; the result is plotted on Fig. 7.

The permeability distribution curve is also plotted on Fig. 7.

Conclusions

The weighted average porosity of the Cardium sand in Pembina field can be calculated from the gamma ray-MicroLog combination using the shale count method, since there is a relation between gamma radiation and porosity. The comparison of the results to core analysis data (Fig. 9) are as follows:

Total sand (including middle unit) —accurate within 1½ porosity per cent high.

Net upper sand—accurate within ½ porosity per cent low.

Net lower sand—accurate within 1 porosity per cent low.

The algebraic weighted average porosity per cent difference for the total sand, upper sand, and lower sand are +0.74, −0.68, and +0.54, respectively.

The gamma ray-MicroLog combination determines net pay in the conglomerate, upper sand, and lower sand within all practical limits compared to core analyses.

Capacity and permeability-distribution curves can be constructed from the gamma-ray log which compares very favorably with those constructed from core analysis data.

References

1. Kernahan, G. M.: "Pembina—Radiation Logging," Canadian Oil and Gas Industries (June 1955), Vol. 8, No. 6, 79-87.
2. Stiles, William E.: "Use of Permeability Distribution in Water Flood Calculations," AIME Trans. (1949), Vol. 186, 9-13.
3. Neilson, A. R.: "Cardium Stratigraphy of the Pembina Field," Journal of the Alberta Society of Petroleum Geologists (April 1957), Vol. 6, No. 4.
4. Justen, J. J.: "Canada's Pembina Field," Journal of Petroleum Technology (September 1957).

Calculation of Enthalpy—1

By Dr. John M. Campbell
University of Oklahoma

THE IMPORTANCE of enthalpy in energy calculations has led to many correlations which attempt to show its variations with system composition, pressure, and temperature. As a consequence, such data are summarized in tabular and figure form for many pure hydrocarbons, water, and common refrigerants.

This is possible, since it is necessary only to know the initial and final temperature and pressure for the section of the process studied, regardless of what happens in between. This is a powerful crutch to the engineer, for we too often cannot analyze the exact mechanism of a process.

Such figures and tables are available throughout the literature, the most famous being the so-called steam tables. A portion of these is reproduced in Table 1. This table may be used to illustrate the application of such tables in general.

Example 1: Steam is generated at 15 psia. and 213° F. in an oil-field steam generator for use in an emulsion treater. Measurements on the condensate leaving the treater heating coils show that the temperature is 200° F., the average quantity being 650 lb. per hour. Determine the heat transferred in B.t.u. per hour.

Solution: If the relatively small pressure drop is ignored, work is equal to zero and $\Delta H = q$.

From Table 1:

H_2 at 200° F. = 168 B.t.u./lb.

H_1 at 213° F. = 1,151 B.t.u./lb.

$\therefore \Delta H = (H_2 - H_1)\ (650)$

$= (168 - 1{,}151)\ (650) = q$

$= \mathbf{-639{,}000\ B.t.u./hr.}$

q is negative, which shows that heat is being removed from the system.

Example 2: Superheated steam at 100 psia. and 400° F. is expanded across a turbine to 15 psia. and 220° F. at the rate of 1,000 lb. per hour. Determine the theoretical horsepower generated.

Solution: Reference to a superheated steam table shows that

H_1 at 100 psia. and 400° F.

$= \mathbf{1{,}228\ B.t.u./lb.}$

H_2 at 15 psia. and 220° F.

$= \mathbf{1{,}154\ B.t.u./lb.}$

From Part 46 (OGJ, Jan. 6, 1958)

ΔH B.t.u./lb. (lb./hr.)

$= q - (2{,}545W$ hp.)

The assumption of adiabatic conditions ($q = 0$) is normally a good one, for such equipment is well insulated, and heat loss seldom exceeds 5 per cent of the total energy transferred.

$\therefore (1.154 - 1{,}228)\ (1{,}000) = -2{,}545W$

$\mathbf{W = 29.1\ hp.}$

Work (expressed as power) is positive, which means that the system has performed work on the surroundings.

Examination of Table 1 shows that there is considerable difference in enthalpy between a liquid and vapor at the same pressure and temperature. This illustrates a basic principle that energy must be supplied to a system in order to vaporize all or part of it—or heat removed for condensation. This amount of energy is commonly known as the latent heat and may be shown by the symbol ΔH_L expressed in B.t.u./lb. The same energy change takes place at constant temperature and pressure when any phase change is involved. When going from liquid to solid, or vice versa, there is a heat of fusion (ΔH_F) and from vapor to solid, heat of sublimation (ΔH_S), both expressible in B.t.u./lb. The word "heat" in these definitions is somewhat of a misnomer, for such changes may be the result of a change in system conditions without any transfer of heat to or from the system.

The pressure and temperature conditions under which a phase change takes place are known as the bubble point and dew point. The former is that condition at which the system is all liquid and only one bubble of

TABLE 1—SATURATED STEAM: PRESSURE TABLE

Psia. p	Temp., °F. t	Specific volume — Sat. liquid v_L	Specific volume — Sat. vapor v_g	Enthalpy — Sat. liquid H_L	Enthalpy — Sat. vapor H_g
0.0886	32.00	0.01602	3,305.700	0	1,075.1
0.1250	40.69	0.01602	2,383.700	8.74	1,078.9
0.2500	59.31	0.01603	1,235.800	27.38	1,086.9
0.5000	79.58	0.01607	641.730	47.60	1,095.6
1	101.76	0.01614	333.790	69.72	1,105.2
5	162.25	0.01641	73.600	130.13	1,130.8
10	193.21	0.01659	38.462	161.17	1,143.3
14.6960	212.00	0.01672	26.828	180.07	1,150.4
15	213.03	0.01672	26.320	181.11	1,150.7
20	227.96	0.01683	20.110	196.16	1,156.1
30	250.34	0.01700	13.763	218.83	1,164.0
40	267.24	0.01715	10.506	236.02	1,169.7
50	281.01	0.01727	8.522	250.09	1,174.0
60	292.71	0.01738	7.179	262.10	1,177.5
70	302.92	0.01748	6.210	272.61	1,180.5
80	312.03	0.01757	5.476	282.02	1,183.1
90	320.27	0.01766	4.898	290.57	1,185.4
100	327.83	0.01774	4.433	298.43	1,187.3
110	334.79	0.01782	4.050	305.69	1,189.0
120	341.26	0.01789	3.728	312.46	1,190.6
130	347.31	0.01796	3.455	318.81	1,192.0
140	353.03	0.01803	3.220	324.83	1,193.3
150	358.43	0.01809	3.016	330.53	1,194.4
160	363.55	0.01815	2.834	335.95	1,195.5
170	368.42	0.01821	2.674	341.11	1,196.3
180	373.08	0.01827	2.532	346.07	1,197.2
190	377.55	0.01833	2.404	350.83	1,198.0
200	381.82	0.01839	2.288	355.40	1,198.7

vapor has formed, indicating that any further change in the same direction will make more vapor. The dew point is where one drop of liquid forms in a heretofore all-vapor system. A system at either its bubble point or dew point is "saturated." For systems containing only one component, such as water, propane, butane, etc., the bubble-point and dew-point conditions are the same. In multicomponent systems of the type encountered on the lease, they occur at different conditions, there existing a range where varying quantities of liquid and vapor exist together. Inasmuch as these are more complex systems, discussions for the present will be limited to one-component systems.

It will become evident that we always find a ΔH, or change in enthalpy. Consequently, there is no necessity of having absolute values of enthalpy. For this reason, as a matter of convenience, the enthalpy is usually considered to be zero at some convenient temperature. The steam table, Table 1, for example, is based on the assumption that $H = 0$ at 32° F.

The base used for enthalpy is dictated by convenience and varies somewhat with the system. There is, therefore, one word of caution necessary—when using different charts in the same calculation, be sure that they use the same base temperature for $H = 0$ before subtracting values.

In reality, enthalpy is only absolutely equal to zero at absolute zero (minus 459° F.). It is because this temperature is so low that a higher base temperature is usually used.

Future installments will show convenient figures for calculating enthalpy for common hydrocarbon systems. Similar data are available in most engineering handbooks and many textbooks.

New Grease Developed for Extreme-Temperature Use

TO MEET the high-speed and high-temperature lubrication requirements of supersonic aircraft and missiles plus sea and land equipment, Shell Oil Co. has developed a new "extreme-temperature grease" with an operating range from —45° to 600° F. Until now, extended lubrication intervals with conventional grease at 600° F. and speeds of 30,000 r.p.m. were impossible.

Designated grades ETR Grease B and ETR Grease D, the lubricant for the past 2 years was field-tested by leading bearing, aircraft, and engine manufacturers, and is regarded as meeting most of the present requirements for extreme-high-temperature lubrication of antifriction bearings.

In one evaluation test of high-temperature performance, in a test rig operating at 10,000 r.p.m., the grease performed satisfactorily for 1,181 hours at 450° F., 621 hours at 500° F., and 162 hours at 600° F. At 450° F. the bearing performance of the grease will surpass the 500 hours minimum specified in MIL-G-25013.

Military need . . . The need for a grease which would not break down under high-speed and temperature conditions is reflected in the progressive change in military specifications. Prior to 1940, most of the needs for industrial high-temperature operation were satisfied with petroleum-base soda soap greases.

In 1944 the first high-temperature military grease specification called for 300 hours' bearing performance at 300° F.—in 1951 a new specification called for a minimum of 600 hours' bearing performance at 300° F.—but as aircraft engineers began to talk more of speed in mach numbers rather than miles per hour, a major increase in bearing performance was called for.

This resulted in a military specification requiring a minimum 500 hours at 450° F. Now the new ETR class of greases has extended the range to 600° F. In addition to its high-temperature range, the grease is water resistant, has an extremely low evaporation rate and excellent mechanical stability. The following are typical of evaluations:

Drop point—Above 550° F.

ASTM Penetration at 77° F.

Worked 60 strokes—331
Worked 100,000 strokes—384

Torque Rate Ratio

(SAE -S-5C Method) in lb. sec./radian at —40° F. —2.4

High-Temperature Performance

(ABEC Rig, CRCL-35 procedure) operated continuously

Time for failure at 600° F.—104 hours

Development of the greases required a completely new reappraisal of available gelling agents and oils since conventional soaps and mineral oils could not offer the necessary thermal and oxidative stability. At high temperatures, gelling agents in conventional greases melt and run out, leaving metal parts without lubrication.

A silicone fluid was selected because it possessed the required volatility, oxidation stability, and viscosity-temperature characteristics. Of all the grease thickeners the vat dyes proved most stable for high-temperature operation and are used in the ETR grades.

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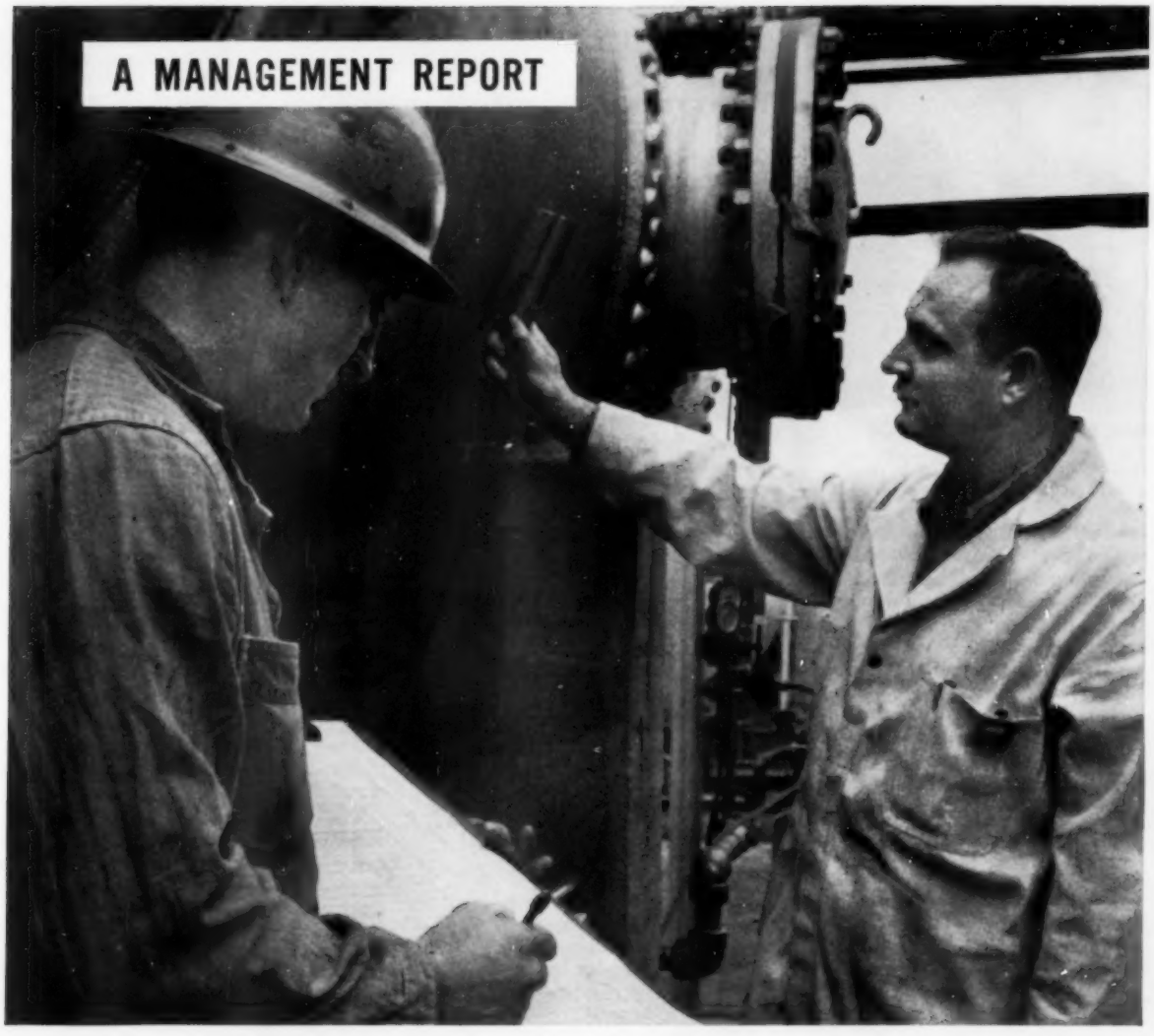
"What a dream I had last night! I met this beautiful blonde who invited me to her apartment . . . her brother turned out to be an engineer and came to work for us!"



SINCLAIR HAS THE ATOM AT WORK

by Dr. A. I. SNOW
Senior Project Chemist
Radiation and Tracer Laboratory
SINCLAIR RESEARCH
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"Practical application of nuclear energy in the oil business isn't just a long-range proposition; at Sinclair we already have the atom profitably at work. Radioactive tracers are doing jobs that were impossible or very time consuming by other means. We use these tracers to evaluate motor fuel and lube oil additives, find trouble spots in intricate refinery units and solve pipe line problems. At the same time, our basic research on the effects of radiation on petroleum processes and products goes forward. Making the atom a work-a-day tool is just one of the many ways in which Sinclair Research is pacing petroleum progress."

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Epoxy resin compound can help

Solve Corrosion Problems

By Arthur Morrison

THIS RESIN sample weathered 11,000 hours of salt water exposure with no change in weight. Fig. 1.

FACED WITH the problem of practical repair of pitted and corroded pipes without undue delay, the Perth Amboy refinery of California Oil Co. has settled on the use of an epoxy resin and silica compound for such maintenance work

Most plants in the petroleum-processing and petrochemical fields which use salt or brackish water for cooling or process work have a continuous maintenance job that is extremely annoying, expensive, and time-consuming.

In the average installation, cement-lined steel or iron pipe from 2 to 24 in. in diameter is used to handle the salt water at pressures up to 150 psi. Any fault or failure of the lining exposes the metal to rapid corrosion by the water, causing seepage and leakage.

The author is in the engineering department of California Oil Co., California refining division, Perth Amboy, N. J.

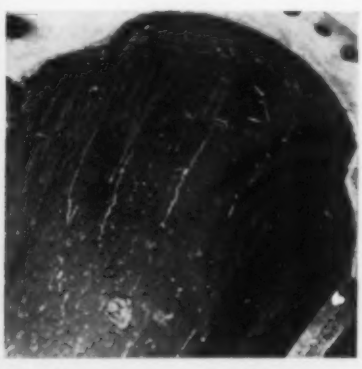
RESIN and catalyst, mixed just before application, is easily worked. Fig. 2.

A parallel situation prevails in the casings of large pumps used to draw the water from its source and pump it to condensers and similar equipment. Silt, sand, and other abrasive materials drawn in with the salt water erode the casings and cause pits and scars as they are thrown outward by the rapidly spinning pump vanes. These pits and eroded areas lower efficiency and subject the pump to extensive shutdowns for repair and replacement.

Leaking pipes . . . These are normally remedied by removing the corroded area and welding in a new piece of metal, or by installation of a new section of flanged pipe. And in both instances, the cement lining must be replaced or extended to protect the new metal of the repair or the inside of the welded-on flanges.

The problem at this point is getting the cement to adhere to the metal, especially when it must be applied in thin or narrow sections. Sometimes, when emergency repairs must be made, there just isn't time to allow the cement to harden to the point where it won't be washed away by the salt water.

The Perth Amboy refinery, in an attempt to solve this problem, called in men from Smooth-On Co. The material they came up with is an epoxy resin and silica compound that has excellent adhesion to clean metal surfaces.



EPOXY repairs in casing show no deterioration after more than year's service. Fig. 3.

The material comes as a two-component system, epoxy compound and hardener, and by using different hardening agents the setup time for the repair can be varied to suit the particular job. From tests of the material and evaluation of the resultant service obtained from repairs, it appears that the mechanical and chemical properties of the hardened resin are well suited for this service (Fig. 1).

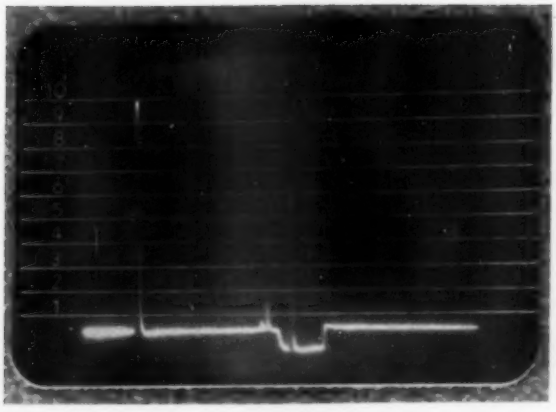
Fig. 2 shows the application of this epoxy compound to the inside of a newly welded flange on a section of cement-lined pipe. Working with the material is simple and can be done either in shop or field. Resin and catalyst are mixed just before using. Both materials have a good shelf life and can be stored for reasonably long periods. Pot life of the mixture is about 30 minutes.

The material has the consistency of a heavy putty, can be troweled on easily and stays in place even with severe handling. The average patch sets up by polymerization in about 4 hours with negligible shrinkage. The refinery is supplied with several catalysts and hardening can be made faster or slower to suit needs when repair is made.

Pits . . . The refinery has also been very successfully in using this material to fill in rather deep pits and eroded areas on the inside of one of the main water pumps used to supply salt water for the entire plant. Fig. 3 shows a closeup of the epoxy repairs. This pump handles salt water at a 40,000-g.p.m. rate and is one of two used alternately for this service.

The patches shown were in service for a year at the time the pictures were taken. No sign of any lifting or deterioration is evident, the patches being as good as when originally installed, following discovery of the damage during a routine inspection. The photo also shows several pits and damaged areas that formed after application of the original patches of the epoxy compound.

Experience with epoxy compound has convinced company officials that it is unsurpassed when properly used for the intended service.



PIPS on screen tell the story of a defective tube-welding job.

This oscilloscope is a key unit in . . .

Immersed Ultrasonic Testing

of welded carbon-steel tubing

ELECTRIC-resistance-welded carbon-steel tubing, at one time considered unreliable for refinery and other types of pressure applications, has won widespread acceptance in the past 10 years. Behind its success are many small but vital advances in the battle to obtain better control of quality in the manufacturing process. The latest step forward, continuous testing of the tube area as the weld is made, promises to win even more converts to ERW tubing in the petroleum field.

Ultrasonic Technique

After 2 years of experimentation and development, The Babcock & Wilcox Co. reports that its tubular product division has adapted the immersed ultrasonic-testing technique to ERW tubing with excellent results. It is believed to be the first use of the technique as a quality control measure for the commercial production of this type of material.

In ultrasonic flaw detection, high frequency sound is generated by exciting a transducer, or "search crystal," electrically. The sound is beamed into metal under test, and is echoed back to the transducer by any defects. This causes the transducer to vibrate, generating current which ultimately shows up on an oscilloscope as a series of "pips." The echoes are timed, permitting the defect to be located by referring to the point at which the sound entered the metal.

Coupling medium . . . Because air is such a poor conductor of sound, best results are obtained by putting the ultrasound into the metal by direct contact or through a coupling medium such as water. The latter technique was developed because of its ready adaptability to tube fabrication methods. Under this system, the crystal transducer is lowered into the fluid and aimed at the tube at the most effective angle, with the ultrasound passing through the fluid into the weld.

Standard testing . . . When tests and experiments proved the effectiveness of immersed ultrasonic testing in detecting both internal and external flaws in the weld, the latest testing equipment was installed on all Babcock & Wilcox Co. electric resistance welding mills. Units are now stationed between the welding head and the sizing rolls, where it gives a reading on the quality of the weld seconds after a weld has been made.

The severity of a defect is measured by the height of the "pip" on the oscillograph screen. Whenever a pip over an established height limit appears on one of the detection units, a warning lamp is lighted on the instrument, a horn blows at the mill inspector's station, and a spray gun is automatically tripped to mark the tube at the defect location.

Investigation of the marked-tube area follows. If intermittent seams in, or close to, the weld are indicated, the lot of tubes involved may be tagged for special checks including visual and magnetic particle inspection, and deformation or other tests.

Additional inspection tool . . . The new equipment is not being used by the company as a basis for passing or rejecting tubing, since immersed ultrasonic testing has not been developed to the point where it can absolutely indicate the size of a defect. Company officials emphasized that it is being used as an additional inspection tool to inspect the entire weld at production speeds. It is of equal value they said, in alerting the mill inspector and operator immediately to the presence of potentially injurious flaws.

Quality control . . . Development of the immersed-ultrasonic-testing technique is of special significance to the tube field, because the acceptance of electric-resistance-welded carbon-steel tubing has been coupled with the ability of producers to control its quality. Today, through rigid quality control both in materials and manufacturing, this type of tubing is accepted by boiler manufacturers, and is used at all temperatures and pressures allowed for the material by the ASME Boiler and Unfired Pressure Vessel Code. It is now being employed in boilers operating at 2700 psi. internal pressure, and in many types of high-pressure heat-exchanger equipment.

Quality control of the tubing starts with the strip itself, and continues through strip processing for welding, the welding operation, finishing and final inspections. Weld quality is by far the most important variable to be controlled.

Other tests . . . Until the present development of continuous ultrasonic inspection, the company controlled weld quality by means of deformation and magnetic-particle tests. Destructive deformation tests, such as flange, expansion, flattening and reverse flattening, were made at frequent intervals.

Magnetic-particle inspection, on a statistical basis, was used to check long lengths of tubing non destructively. To insure shipment of tubes with perfect weld quality, it has been the company's practice to inspect finished tubes by magnetic-particle testing—100 per cent, if necessary—should mill control tests reveal any questionable qualities of the weld.

Orthodox controls of this nature have played an important role in bringing electric-resistance-welded pressure tubing into widespread use. Immersed ultrasonic testing, however, from results to date, seems to offer a solution to the problem of 100 per cent inspection of the weld area.

Part 24 of a series

EXPLORATION · · DRILLING · · PRODUCTION · · PIPELINE · · REFINING

PETROdatics
ELECTRONIC COMPUTERS

A computer program can help

Solve Gas Network Problems

By Robert L. McIntire
The Datics Corp.

PETROdatics No. 16 explored the design of refinery water networks.[1] That article also mentioned that the same computer procedure could be used to design low-pressure steam networks. A new program, described here, is required to solve gas networks.

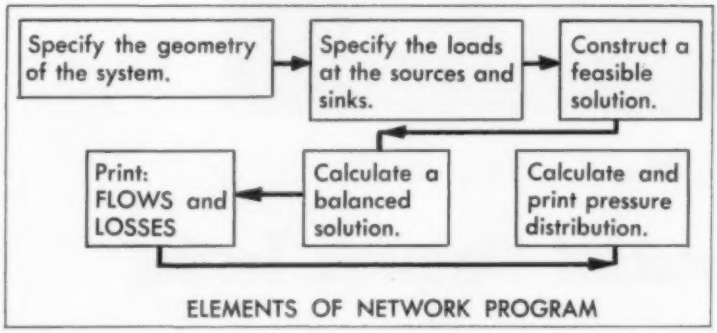
Gas-network systems of the type which present computational problems of real significance exists in two distinct areas of the petroleum industry. In the first, a gas-gathering system must be designed to collect the gas from a large number of wells in the producing field and deliver the gas to a central processing point. There are several aspects of this engineering problem which deserve computer treatment:

- What is the possible input from each well as limited by the formation and by the proration laws?[2]
- Where are the compressors needed?
- Where should the pipes be interconnected to minimize the investment cost of the system?
- What is the pressure distribution throughout the network, given the sources and sinks?

Each of these problems has been attacked by computers. It is the last-mentioned problem to be discussed here.

In a second area, gas-distribution companies operate almost identical networks. These networks serve the function of delivering gas from one or two central points to many distribution points. Although the gas is flowing in the opposite direction, the instructions to the computer remain unchanged.

A satisfactory computer program for gas networks will consist of the basic elements shown in the block diagram. Blocks 1 and 2 specify the given data available from the design engineer. The resistance to flow of each pipe must be given in a form usable to the flow equation,[3] e.g.:


Specify the geometry of the system.
Specify the loads at the sources and sinks.
Construct a feasible solution.
Calculate and print pressure distribution.
Calculate a balanced solution.
Print: FLOWS and LOSSES
ELEMENTS OF NETWORK PROGRAM

A SATISFACTORY computer program for a gas network will consist of the basic elements shown in the block diagram.

$$P_1^2 - P_2^2 = \left[\frac{ESL}{(33.95)^2 d^{16/3}} \right] Q^2 = KQ^2$$

This formula reduces to a simple expression identical in form to that used in water networks.

Blocks 1 and 2 also indicate to the machine how the pipelines are interconnected. A "line" may be defined by naming the two "nodes" it connects. An input or output from the system is specified by naming the node and the positive or negative quantity to be added at that point.

Block 3 assumes a flow distribution through the system. This distribution is feasible in that it satisfies the material balance but not necessarily the energy balance. Block 4 is the iterative portion. The Hardy Cross method has been used with success although presumably there is a possibility that it will not converge under extreme conditions. This author has yet to experience such conditions.

In Block 4, the solution tolerance is usually expressed as a percentage of the total flow or as a minimum discrepancy in the head loss around a loop. Extra iterations on a computer cost very little and it is easily possible to converge to within 1 lb. or 0.1-lb. pressure drop.

The pressure at one node in the system must be given. After Block 5, the losses in each line can be used to compute the absolute or gaged pressures at other nodes in the system.

From the computer standpoint, the problem is solved. The design engineer can use this solution technique to study many specific problems.[4] The pipe diameters and fouling factors may be varied. Single lines may be looped to reduce losses. Compressors may be installed. More advanced computer programs have even incorporated the losses due to pumps, orifices, strainers, and headers into the generalized machine instructions. Digital computers have become an increasingly useful tool to gas-pipeline engineers.

Nomenclature

E = line efficiency
S = gas gravity
L = line length (ft.)
Q = flow rate (cu. ft. per minute)
d = line diameter (in.)
K = composite resistance factor

References

1. PETROdatics No. 16, The Oil and Gas Journal, August 5, 1957, McIntire, R. L.
2. An application now working in a major petroleum company.
3. Daugherty, R. L., and Ingersoll, A. C., McGraw-Hill, New York, p. 212 ff. (1954).
4. Fair, G. M., Engineering News Record, 120, pp. 342-3 (1938).

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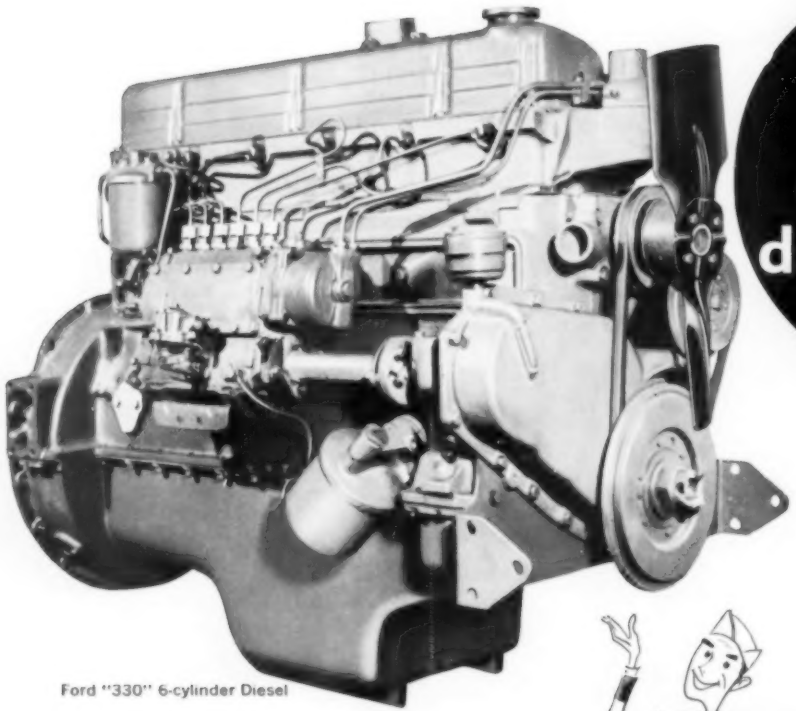
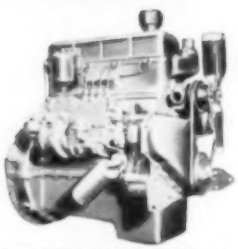


Ford "330" 6-cylinder Diesel



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Displacement—Cubic Inches		220	330
Brake Horsepower	Dynamometer	61 @ 2250	96 @ 2250
	Continuous	49 @ 2250	77 @ 2250
Torque	Dynamometer	152#' @ 1600	236#' @ 1500
	Continuous	131#' @ 1600	189#' @ 1500
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How rotary and turbo-type

Compressor Operations Differ

ROTARY AIR OR GAS compressors are generally one-stage machines, compressing to moderate pressures. Most of these units have no provision for water cooling.

In some machines, it is necessary to have the rotary elements—cams, drums, blades, or gears—form an airtight contact with the casing so that the air can leak neither around the ends of the rotary member nor past the peripheral surface. Where two rotary members are working upon one another, contact between them must also be airtight.

Fine machine work is necessary for the construction of these compressors. Maintenance of the original condition is necessary for their efficient operation over a long period. The volume of air increases with the speed; therefore, it is economical to run these machines at very high speed. Unless care and attention are given to their lubrication, wear will increase the possibility of leakage and reduce output.

Lubrication of rotary-displacement compressors consists of supplying a film of oil to the surface of all sliding internal parts and to the bearings supporting the rotary parts. Its purpose is twofold: (1) Supply a lubricating oil film to prevent wear and abrasion of parts in contact at high surface speeds and, (2) supply a sealing film to prevent leakage of air under pressure past the compressing parts.

This material taken from process-training-program manual, Baton Rouge, La., refinery of Esso-Standard Oil Co.

Turbocompressors . . . The development of the turbocompressor is due in great measure to the development of high-speed driving units such as electric motors and steam turbines. They are of simpler construction than the reciprocating compressor.

The ordinary fan is a simple example of a blower of the centrifugal or turbo type. Its objective is to move a quantity of air from one place to another. Fans and exhausters for ventilating purposes and for cooling purposes are common installations.

Turboblowers and compressors differ from both reciprocating compressors and rotary compressors in that no attempt is made to seal the rotor or compressing element. Compression is obtained by giving the air a high velocity to build up air pressure.

The turboblower is built for delivering air or gas at discharge pressures up to about 30 lb. and for capacities from 1,000 to 80,000 cu. ft. of air per minute. The turbocompressor is built for discharge pressures of about 300 lb. and capacities of 5,000 to 50,000 cu. ft. of gas per minute, or more.

The turbocompressor is built in stages to obtain a high terminal pressure. Speed is one of the factors that make possible the economical uses of these machines. Depending on the capacity, speeds range from 2,500 to 20,000 r.p.m. Direct drive from a steam turbine is used for high speeds. Electric motors of high speed are also used for drives, sometimes through step-up gears.

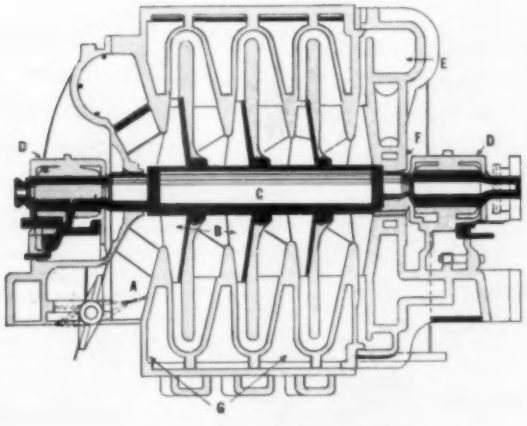
A four-stage turbocompressor is shown in Fig. 1. This compressor consists of an outer shell or casing which supports two bearings, one at either end. The shaft, C, is supported by the bearings, D, which are totally enclosed and oiltight. The impeller blades, B, are attached to the shaft, C, and rotate with it. Gas enters the compressor at A, drawn in by the rotating impeller blades, passes through the four stages successively and is discharged through the passage, E.

The rotating element of the blower is shown in Fig. 2. It consists of a shaft upon which are mounted the impellers.

The diaphragm separating the impeller blades is shown in Fig. 1. The diaphragm in the illustration has curved guide vanes which direct the flow air or gas created by the impeller blades from one stage into the next stage of a multistage unit.

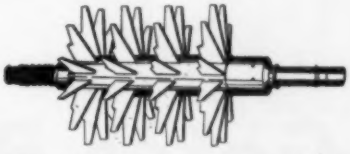
At the high-pressure end of the turbocompressor, packing rings, F, are necessary to prevent the leakage of air or gas at that point where the shaft passes through the outer casing. The low-pressure end of the machine needs no packing, air or gas being drawn into the compressor at the end.

The compression of air or gas in these units produce heat the same as in reciprocating compressors, and to obtain the highest production from the unit it is advisable to keep the air or gas at a moderate temperature.

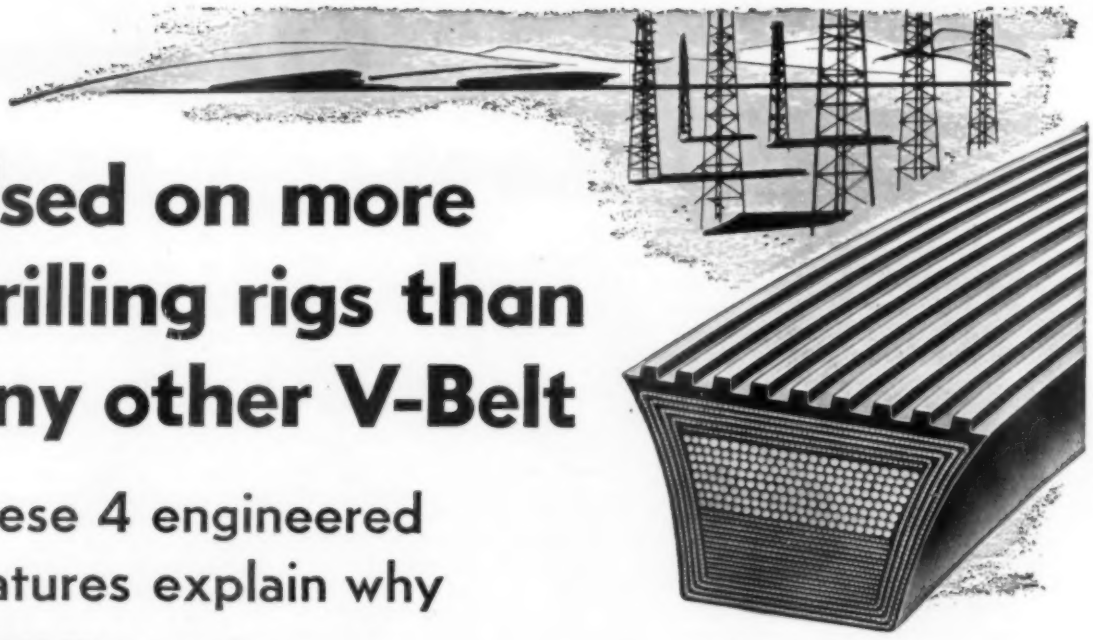


A SUCTION PORT
B IMPELLER BLADES
C SHAFT
D BEARINGS
E DISCHARGE PASSAGE
F PACKING RINGS
G WATER COOLING SPACE

STAGES of turbocompressor. Fig. 1



ROTATING element of blower. Fig. 2.



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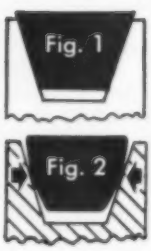
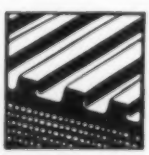


2. Concave Sidewalls (U.S. Pat. No. 1813698). Provide sure pulling power, less wear, longer V-belt life, because as belt bends around the sheave, concave sides fill out . . . become straight . . . fit sheave grooves evenly (Fig. 1). Straight-sided belts bulge at the sides when bent. Uneven contact (Fig. 2) causes uneven wear, shorter belt life.



3. Stabilizing Ribbed Top (U.S. Pat. No. 2548135). Dampens vibration . . . protects top of belt against damage . . . keeps belt running smoothly over idler-equipped mud pump drives, with no side whip.

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TPA170

Flame Method Measures Sodium

• Unlike chloride-based tests, the flame spectrophotometer shows sodium in crude

By K. G. Stoffer

BECAUSE the proportion of the sodium content to the total salt content varies somewhat from one producing area to another, it would theoretically be necessary to determine these ratios.

Practically speaking, however, for routine monitoring of wells or charging stocks it is easier to forego determining this ratio and to correlate the luminosity of the sodium line for various crudes with their salt values as determined by standard extraction procedures. This was done for six of the producing areas in eastern Saudi Arabia.

Although the log-log curves produced by plotting luminosity versus salt values obtained by the TEL extraction procedure, fall into a fairly narrow band, it was found that the points of a given producing area generally fell in a line distinct from that of other producing areas. This was expected since chemical analysis of contaminating water showed its composition to vary from area to area, but to be relatively constant in a given area.

Author is chemist with Arabian American Oil Co. at Dhahran, Saudi Arabia.

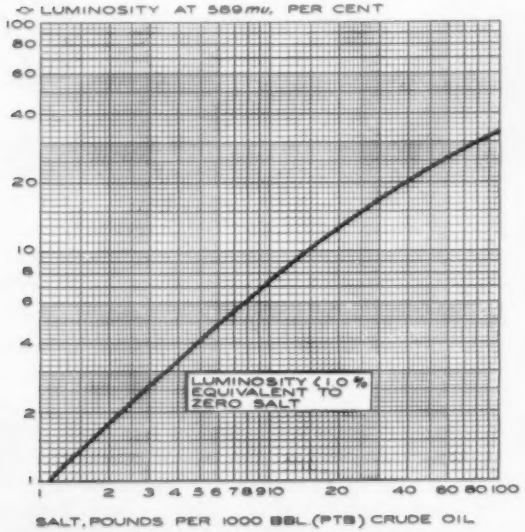
Sample preparation . . . The only preparation of the sample found to be necessary for analysis, aside from agitation to insure homogeneity, is to dilute it half and half with clean, commercial-grade benzene. Viscosity of undiluted crude oil is such that the aspirating action of the burner may be impaired, or, even worse, the aspirating nozzle may become clogged. The possible benefit of burning undiluted samples in large-bore burners was not checked. It is felt that dilution with benzene is the better practice.

No upper limit . . . The flame method appears to have no upper limit to the range of salt it will determine. With 1:1 dilution with benzene it will easily analyze crudes containing up to 100 lb. of salt per 1,000 bbl. Salt concentrations above this amount may be determined by using further dilution.

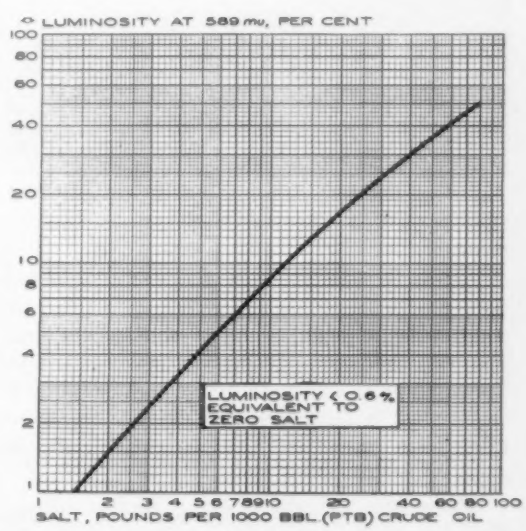
Experimental Work

Figs. 1 and 2 show sodium luminosity curves constructed for three producing areas in Saudi Arabia. As it so happens, the curve for the Ain Dar area (Fig. 1) coincides with that of the Shedgum area.

This would be expected because the areas are adjacent and are part of the large Ghawar field. The curve for the Abaiq field (Fig. 2) is distinct from that of the other two areas. This difference was found empirically by plotting sodium luminosity vs. salt values obtained by extraction procedures already described.



CALIBRATION CURVE for salt in Ain Dar and Shedgum crudes. Fig. 1.



CALIBRATION CURVE for salt in Abqaiq crude. Fig. 2.

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By W. L. Nelson, Technical Editor

Catalytic Yields From Different Crudes

We are about to crack somewhat naphthenic crude oil rather than our regular Mid - Continent catalytic cracking stock. What may we expect in the way of yields?—S. Wm. T.

This question was answered in part in the September 17, 1956, issue of this page. However, additional information has become available since that time, and hence the conclusions stated here do not check exactly with the data given then.

Refiners are, of course, interested in the behavior of a cracking plant at a fixed (or maximum) percentage of catalytic coke production. On such a basis, the approximate effect of kind of feed stock, on gasoline yield is somewhat as shown in the accompanying table.

There are, of course, great variations in the behavior of stocks because other factors than characterization factor are not fixed, such as asphaltic entrainment, metal contaminants, etc. However, if these other influences are eliminated, it is believed that the tabulation indicates the type of behavior to expect with the new stock.

PERCENTAGE OF DEBUTANIZED GASOLINE

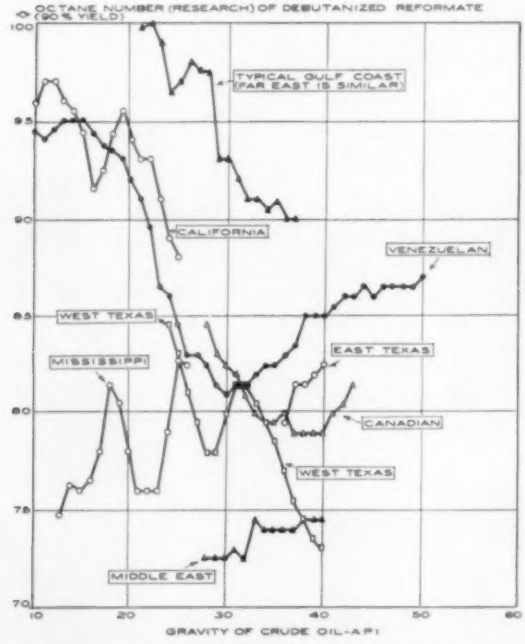
Char. factor of feed stock	Coke by weight—8 per cent	6 per cent	4 per cent
11.0	43	39	32
11.2	44	40	33
11.4	46	41	35
11.6	49	43	37
11.8	56	47	39
12.0	..	59	43
12.1	..	..	52

Quality of Reformate From Typical Crude Oils

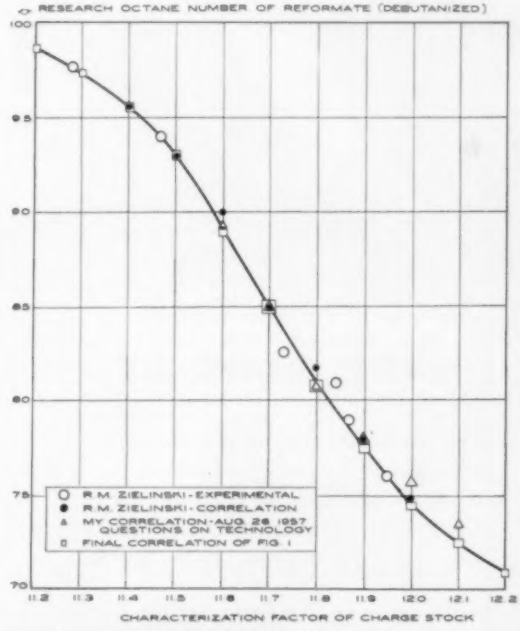
We have noticed your answer of August 26, 1957, "Platinum Reforming Yields at High Octane Number." What does this mean with respect to our Canadian crudes? Are they the equal of other crude oils? W.G.

The quality of the reformates from various typical crude oils is indicated in Fig. 1. Canadian reformates are superior to those of West Texas crude oils and nearly the equal of East Texas reformates. They are greatly superior to Middle East reformates.

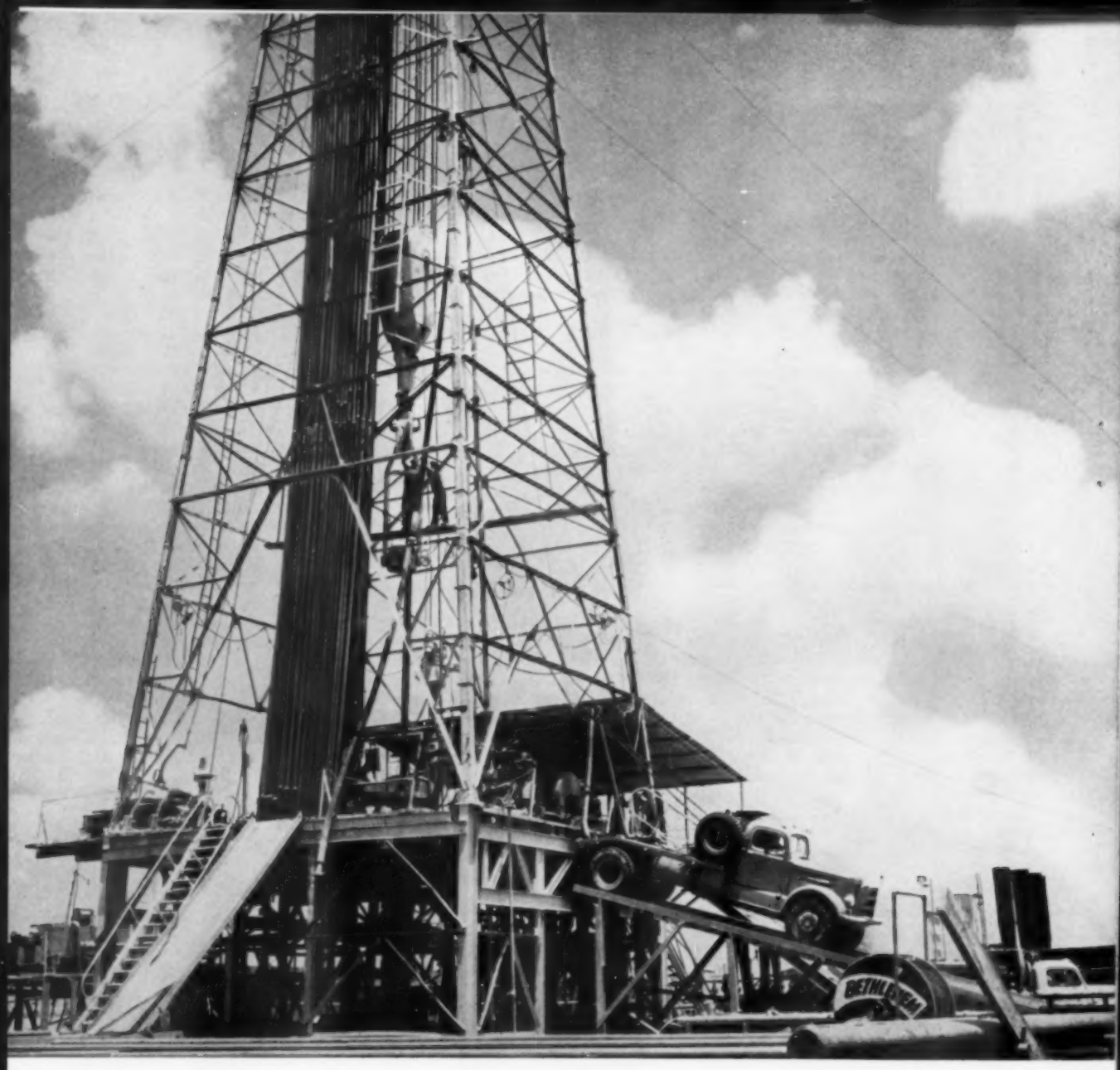
High - octane - number reformates can be produced from naphthas from any crude oil, but the yield varies greatly. Thus, the values shown in Fig. 1 are for a 90 per cent yield of debutanized reformate (about 94 per cent including the butanes produced by the process or 104 per cent for 10-R.v.p. material). A 90 per cent yield is thought to be economically feasible. The (approximate) octane numbers of Fig. 1 were obtained from the characterization factors of the naphtha part of the various crude oils, from the correlation shown in Fig. 2. It is based not only on my yield correlation of August 26, 1957, p. 129, The Oil and Gas Journal, but also on recent excellent data of R. M. Zielinski Pet. Division of the American Chemical Society, New York, September 8-13, 1957, "Relationship of the Composition of Reformer Feed to Reforming Yield."



APPROXIMATE OCTANE NUMBERS of catalytic reformates from various types of crude oils when the yield of debutanized reformate is 90 per cent (about 94 per cent with butanes). Fig. 1.



REFORMATE OCTANE NUMBER as a function of feed properties for a yield of 90 per cent (about 94 per cent with butanes). Fig. 2.



WIRE ROPE AT WORK

This was a deep one, a real challenge to the crew. When photographed, the rig had already put the hole down nearly 14,000 ft, and a long string of casing was being set. Drilled by Falcon-Seaboard, the well was in the Gulf Coast country near Ridge, Louisiana.

To guard against mishaps during the lowering and setting of casing, the crew installed a husky new Bethlehem Purple Strand rotary line. A 1¼-in. 6x19 rope with IWRC, the line had the high strength needed for the tremendously heavy loads involved. And of course, after the casing was set, this tough wire rope was available for drilling work, where it would add many thousands of ton-miles to its service record.

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Among the

Drilling Contractors

Woolf & Magee, Tyler, Tex., are on a new contract job in Adams County, southwestern Mississippi. It is a 6,500-ft. Wilcox test for Billups Brothers and Phil U. Brown at 1 Giles, in 3-7n-3w. Location is on the Clermont Plantation, about ¾ mile north of Gardens field, productive from a 4,600-ft. Wilcox pay.

Sunnyland Contracting Co., Rayne, La., has contracted for a deep test to be drilled in the Pine Ridge area of northern Adams County, southwestern Mississippi. Drilling is for Robert O. Sigler and Michael J. Eubanks. The test is set up to go to 10,200 ft. for a look at Tuscaloosa sands. Production at Pine Ridge is from Wilcox sands at 5,360 to 5,600 ft. Sunnyland's location is nearly 2 miles west of the field.

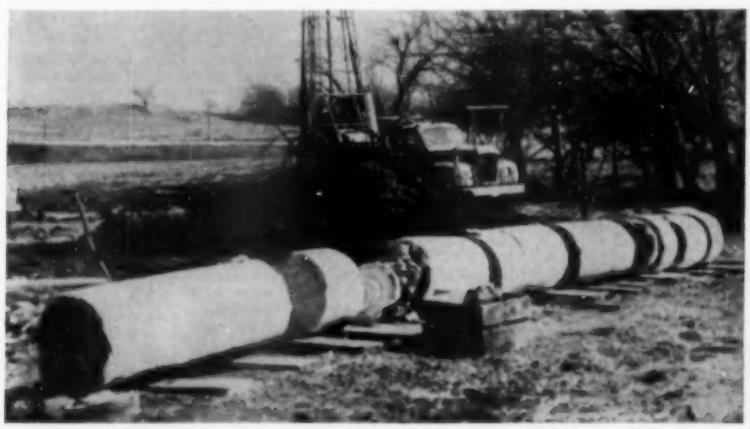
John B. Stephens, Mount Pleasant, Tex., is contractor on a 7,500-ft. Travis Peak test to be drilled for F. R. Jackson and S. H. Killingsworth, of Longview, Tex., at a wildcat location about 2 miles east of Mount Vernon, in Franklin County, northeastern Texas. Location is on the operators' L. C. Moore lease, in the Anna Willis Survey.

Globe Drilling Co. has a new wildcat operation in southern Anderson County, East Texas. It is a contract job for the Grelling Estate, of Tyler, Tex., with Woodbine sand as its objective. This should be found at about 6,300 ft. Location is at 3 Brown, in the S. C. Collison Survey. Location is less than 200 ft. north of the Houston County line, and less than a mile north of a Woodbine test **Ace Drilling Co.,** of Dallas, has been drilling for Toreador Royalty Corp., also of Dallas.

Halbert Drilling Co., Tyler, Tex., has a rig working for British-American Oil Producing Co. on a Woodbine test about 2½ miles southwest of Jarvis, and about 7 miles north of Slocum, in southeastern Anderson County, East Texas. Location is at 1 Davey-Royall, in the J. W. Royall Survey. Plans call for a 6,150-ft. test.

Mustang Drilling Co., Tyler, Tex., is on a 4,500-ft. job northwest of Troup, in southeastern Smith County, East Texas. It is drilling for Sam Sklar, of Shreveport. Location is at 1 Grady Wilson, in the William Miller Survey. Woodbine sand is the objective.

J. P. Petkas Drilling Co. is scheduled to go to 9,200 ft. on a wildcat test it has contracted to drill for Eason Oil Co., of Oklahoma City, in northern Matagorda County, Texas Gulf Coast. Location is in the John



KING-SIZED CORES in the picture were obtained with a light truck-mounted rotary rig used by Layne Western Co., of Omaha, in test-drilling for a quarry site near Weeping Water, Neb. The 24-in. cores are crystaline limestone. They were taken with a 26-in. calix core-barrel and steel shot at depths from 40 to 62 ft. The rig was a Failing 1500 Holemaster, designed to handle drill-pipe and casing loads up to 25,000 lb. to depths of 1,500 ft. Ralph Dyas, drilling superintendent for Layne Western, directed the operation.

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Partin Survey about 4 miles southwest of Markham. It is a little more than 2 miles north of Wilson Creek field, and about 5½ miles south of Markham field.

Perry Drilling Co. is contractor on a 5,000-ft. wildcat test Von Glahn Oil Co., Inc., and associates propose to drill in the Gorman area, northern Los Angeles County, California. Location is in 18-8n-18w.

D & M Drilling Co., Inc., Great Bend, Kans., is working on a 5,000-ft. contract operation 6 miles southwest of Shallow Water, Scott County, western Kansas. Location, at 1-K Lang, in 12-20s-34w, is 4 miles northwest of Shallow Water pool, nearest production.

Graham - Michaelis Drilling Co., Wichita, Kans., is drilling for Helmerich & Payne on a Pennsylvanian-Mississippian exploratory test 13 miles northwest of Sublette, Kans., in Haskell County, western Kansas. Location is about 8 miles south of Pleasant Prairie pool within the Hugoton gas (Permian) area. Proposed depth is 5,400 ft.

Gulf Coast Drilling & Exploration, Inc., Laurel, Miss., is getting started on a new deep operation for Skellly Oil Co. in western Jasper County, Mississippi. Its location, a wildcat, is about 2 miles northwest of Bay Springs, at 1 Evans, in 23-2n-10e. Objective is the deep Lower Cretaceous-Hosston horizon about 13,000 ft. The prospect is about 13 miles north of Soso field, the state's most important Lower Cretaceous production so far.

Deepwater Exploration Co., Houston, has the contract on Anderson-Prichard Oil Corp.'s offshore drilling job in Block 174, Ship Shoals area, in the Gulf of Mexico, about 45 miles off the coast of Terrebonne Parish, Louisiana. Location is 3 miles north of a deep gas-discovery well completed by Gulf Oil Corp. in Block 176 about a year ago. Deepwater's new operation is a 14,000-ft. test.

Rocky Mountain Drilling Co., Los Angeles, has a rig working for The Texas Co. on a newly started deep test in the Stockdale area, 3 miles southwest of Bakersfield, in Kern County, California. It is a 13,500-ft. job at a wildcat location 2½ miles northeast of deep productive (lower Stevens sand) in East Gosford field. Texaco designates the test as 1 KCL-Stockdale. Spot is in 9-30-27.

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PIPELINE

CONSTRUCTION REPORT

Who's Laying Line—and Where

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way.

U.S. Crude-Oil Pipelines

- **Belle Fourche Pipeline Co.**
  Project: 30 miles of 6-in. from Donkey Creek pool to Fiddler Creek pool in northeastern Wyo. Will later build a line from Fiddler Creek to connect with Butte Pipe Line Co. near Osage, Wyo.
  Status: Planned.
- **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.)
  Project: Line from lower Delaware Bay to Philadelphia.
  Status: Planned.
  Completion: 1960.
- **Gillette Pipeline, Inc.** and **A. W. Hartwig, Inc.**
  Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
  Status: Has applied for permit from Wyoming Public Service Commission.
- **Great Northern Railway Co.**
  Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Montana and North Dakota, to Clearbrook or St. Paul, Minn.
  Status: Planned.
  Contractor: **Pipe Line Technologists, Inc.** has completed feasibility study.
- **Humble Oil & Refining Co.**
  Project: 90 miles of 16-in. from Hawley to Comyn, Tex.
  Status: Survey and right-of-way work under way.
  Completion: Late 1958.
- **Jayhawk Pipeline Corp.** (Colorado Oil & Gas Corp., National Cooperative Refinery Association)
  Project: 242 miles of 10 and 12-in. from western Meade County, Kansas, to Valley Center near Wichita.
  Status: Will start spring 1958.
  Contractor: **Pipe Line Technologists,** Houston, has engineering contract.
  Completion: August 1958.
- **Offshore Gathering Corp.,** Houston.
  Project: 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana. (Dual line.)
  Status: Proposed.
- **Oil Field Pipe Line, Inc.**
  Project: 200 miles 8 and 12-in. from near Elkhart, to Ellinwood, Kans.
  Status: Proposed.
- **Shell Oil Co.**
  Project: 17 miles of 3, 4-in. in La. Delta area.
  Status: Under way.
  Contractor: **Brown & Root, Inc.,** W. P. Stanley, supt., office at Buras.
  Completion: March 31, 1958.
- **Shell Pipe Line Corp.**
  Project: 11 miles of 8-in., 3 miles of 10-in., 10 miles of 12-in., 37 miles of 16-in., and 60 miles of 20-in. from Misaissippi River Delta area to New Orleans refining area.
  Status: Planned.
  Contractor: **Coates Field Service, Inc.,** has right-of-way acquisition and claims settlement.
  Completion: September 1958.
- **Sinclair Pipeline Co.**
  Project: 150 miles of 20-in. from Teague, Tex., to Houston.
  Status: Under way.
  Contractor: **Lone Star Constructors, Inc.** has 143 miles; **Golightly Construction Corp.** has 6 miles.
  Completion: June 1958.
- **Southern Kansas Pipeline, Inc.**
  Project: 200 miles of 6 to 10-in. in Kans. from southwestern Meade County to 10 miles north of Arkansas City.
  Status: Proposed. Request filed with Kansas Corporation Commission for permit.
- **Texas-New Mexico Pipe Line Co.** (Sinclair, Texas Co., Tidewater, Empire)
  Project: 512 miles of 16-in. from southeast corner of Utah to Jal, N. M.
  Status: Under way.
  Contractor: **Four Way Co., Inc.,** has 150 miles from Aneth field southeast. **Panama, Inc.,** has remaining 362 miles.
  Completion: May 1958.
- **Toronto Pipeline Co.**
  Project: System to connect fields in Cheyenne, Morrill, and Banner counties, Nebr., to Platte Pipe Line Co.'s 20-in. line from Wyoming to Wood River, Ill., and 13 miles of 4-in. plus field lines to Platt's Redding station.
  Status: Planned.

U.S. Products Pipelines

- **Alaska-Yukon Refiners & Distributors, Ltd.**
  Project: Two lines: one 150 miles from Haines to Haines Junction, Alaska, linking with government Canol line; another from Tok Junction, on Canol line, to Anchorage.
  Status: Proposed.
  Completion: 1959.
- **American Pipe Line Co.**
  Project: Line from Gulf Coast to New York City. Has ODM approval to amortize 40 per cent of cost with fast writeoff.
  Status: Proposed.
- **Buckeye Pipe Line Co.**
  Project: 70 miles of 8-in. from Wayne to vicinity of Durand, Mich.
  Status: Planned.
  Completion: 1958.
- **Cherokee Pipe Line Co.** (Continental Oil Co., Cities Service Oil Co.)
  Project: 78 miles of 12-in. from Ponca City to Tulsa, Okla.
  Status: To start February 1958.
- **Clark Oil & Refining Co.**
  Project: 15 miles of 8-in. from Blue Island, Ill., to Hammond, Ind., area.
  Status: Planned.
  Completion: Mid-1958.
- **Columbia Gas System, Inc.**
  Project: Line from proposed plant near Kenova, W. Va., to proposed plant and storage facilities at Siloam, Ky.
  Status: Planned.
- **Conn-Mass Pipe Line, Inc.**
  Project: 62 miles of 8-in. and 7 miles of 6-in. from New Haven, Conn., to Springfield, Mass.
  Status: Proposed.
  Contractor. **Coates Field Service, Inc.,** has right-of-way acquisition and claims settlement.

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PIPELINE CONSTRUCTION

Project: 88 miles of 8-in. from Boston to Springfield, Mass.
Status: Proposed.
Project: 133 miles of 16-in. from Linden, N. J., to Hartford, Conn.
Status: Proposed.
Project: 38 miles of 6-in. from Waltham to Fitchburg, Mass.
Status: Proposed.

- **El Paso Natural Gas Co.**
  Project: 240 miles of 6-in. from Odessa to El, Paso, Tex.
  Status: Under way.
  Contractor: **McVean & Barlow, Inc.,** E. J. Miller, supt.
  Completion: March 1, 1958.
- **Everglades Pipe Line Co.**
  Project: 60 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport and terminals south.
  Status: Under way.
- **Gulf Refining Co.**
  Project: 60 miles of 8-in. propane and natural gasoline line from Barbers Hill to Port Arthur, Tex.
  Completion: March 1958.
- **Katy and New York Central Railroads**
  Project: 2,000 miles of 10 or 12-in. from Houston through Kansas City, St. Louis, Indianapolis and Cleveland to Syracuse then down to New York City. A branch would go through Chicago to Detroit.
  Status: Planned.
  Contractor: **Williams Brothers Co.** has feasibility study.
- **Laurel Pipe Line Co.** (Gulf Refining Co., Sinclair Pipe Line Co., The Texas Co.)
  Project: 100 miles of 24-in. and 340 miles of line graduating down to 14-in. at the west terminus, from Philadelphia to Cleveland.
  Status: To start April 1958.
  Contractor: **Pipe Line Maintenance & Construction Co.,** Camp Hill, Pa., has Susquehanna River crossing.
  Completion: August 1958.
- **Leonard Refineries, Inc.**
  Project: 43 miles of 6-in. from Alma to Lansing, Mich.
  Status: Planned.
  Contractor: **Welded Construction Co.**
  Completion: Spring 1958.
- **Ohio Oil Co.**
  Project: 265 miles of 12-in. from Wood River, Ill., to Chicago.
  Status: Planned.
  Completion: 1958.
- **Underground Storage & Exploration, Inc.**
  Project: 393 miles of 12-in. L.P.G. line from Moundsville, W. Va., to Newark, N. J., plus 95 miles of 6, 8-in. laterals to Mauch Chunk, Pa., and to Philadelphia.
  Status: Proposed.
- **Union Oil Co. of California**
  Project: 815-mile line from Rifle, Colo., to Los Angeles refining area.
  Status: Proposed.

U.S. Natural-Gas Pipelines

- **American Louisiana Pipe Line Co.**
  Project: 7 miles of 16-in. and 5 miles of 12-in. from Second Bayou to Cameron, La.
  Status: Under way.
  Contractor: **Ford, Bacon & Davis Construction Corp.**
  Completion: December 1958.
- **Arkansas Louisiana Gas Co.**
  Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.
  Status: Long-range plans.
- **Carnegie Natural Gas Co.**
  Project: Two parallel lines to provide coke-oven gas to six Pittsburgh area plants: 9 miles of 55-in. and 4 miles of 43-in. each.
  Status: Under way.
  Contractor: **Williams Brothers Co.**
  Completion: January 1, 1959.
- **Chicago District Pipeline Co.**
  Project: 52 miles of 30, 36-in. between Joliet and Chicago, Ill.
  Status: Approved by FPC examiners.
  Completion: 1958.
- **Cities Service Gas Co.**
  Project: 75 miles of 30-in. from Independence to near Welda, Kan.
  Status: Under way.
  Contractor: **R. H. Fulton & Co.**
  Completion: February 1958.
  Project: 6 miles of 30-in. in Montgomery County, Kansas, and 18 miles of 26-in. in Anderson and Franklin counties, Kansas.
  Contractor: **R. H. Fulton & Co.** has the 26-in.
- **Coastal States Gas Producing Co.**
  Project: A 20-mile gathering system from the Rock Island area of Colorado County, Tex., to the United Gas Corp. system.
- **Coastal States Gas Producing Co. and Southern Coast Corp.**
  Project: 45 miles of 2 to 10-in. in Bee County, Tex. to connect presently shutin fields with Texas Eastern Transmission Corp.'s system.
  Status: Planned.
- **Coastal Transmission Corp.**
  Project: 562 miles of 12, 20, 22, 24-in. main line and 336 miles of 2 to 14-in. gathering lines between McAllen, Tex., and Baton Rouge, La.
  Status: Survey and right-of-way work under way.
  Completion: January 1, 1959.
- **Colorado Interstate Gas Co.**
  Project: 66 miles of 30-in., 40 miles of

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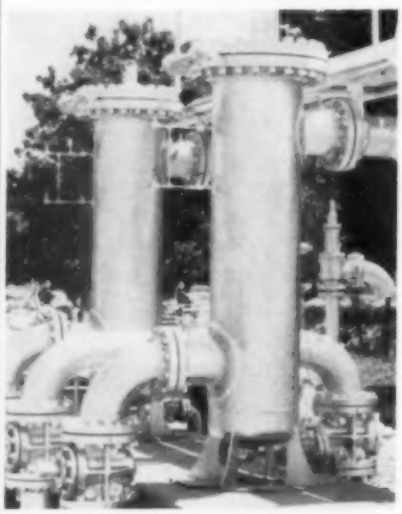

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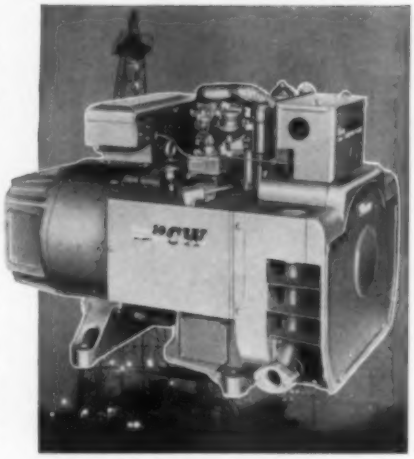

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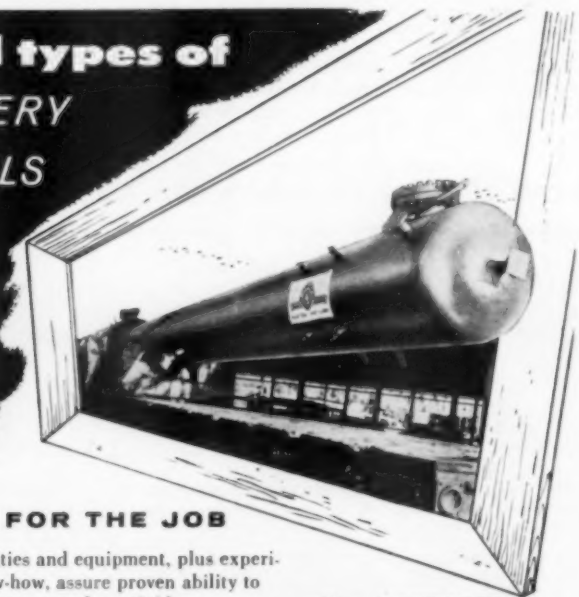

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34-in., 109 miles of 26-in., and 100 miles of 24-in. from Springfield, Colo., to Pubelo, Colo.; 345 miles of 30-in. from Kit Carson, Colo., to Beatrice, Neb.; 24 miles of 22-in. Tex. Panhandle looping.

Status: Approved by FPC examiners.

- **Consolidated Gas Utilities Corp.**

Project: 21 miles of 12-in. and 10 miles of 8-in. at Altus, Okla.

Status: Approved.

- **Eastern Shore Natural Gas Co.**

Project: 34 miles of 8-in. and 90 miles of 6-in. from connection with Transcontinental Gas Pipe Line Corp., in Maryland, across entire length of Delaware to Salisbury.

Status: Approved.

- **El Paso Natural Gas Co.**

Project: 95 miles of 34-in. San Juan main line loops.

Status: Under way. Partially certificated.

Contractor: **R. H. Fulton & Co.** has 28 miles. **Western Pipeline, Inc.,** has 47 miles. Remainder to be let.

Completion: April 1, 1958.

Project: 18 miles of 12-in. between Good Field in Borden Co., and the East Vealmoor gasoline plant in Howard Co., Tex.

Status: Has temporary FPC approval.

Project: 177 miles of 20-in. from Sonora plant, Sutton County, to Plains plant, Yoakum County, Texas.

Status: Planned. Filed for FPC permit.

Completion: July 1, 1958.

Project: 193 miles of 30-in. Permian-San Juan main line loops.

Status: Planned. Filed for FPC permit.

Completion: September 1, 1958.

Project: 216 miles of 6 to 34-in. and 533 miles of various size in Ariz., Tex., N. M.

Status: Filed for FPC permit.

Project: 38 miles of various size line to make additional gas available at the McElroy-Wilshire plant near Crane, Tex.

Project: 500 miles of 34-in. from Twin Falls, Idaho to California border near Las Vegas, Nev.

Status: Planned.

Completion: September 1, 1959.

- **Equitable Gas Co.**

Project: 12 miles of storage line in Lewis Co., W. Va.

Status: Approved.

- **Gulf Interstate Gas Co.**

Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, Louisiana, and 9 miles of various size field lines in Acadia and Vermilion parishes, Louisiana.

Status: Approved.

Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, Louisiana, and 3 miles of 6-in. loop in Cameron Parish, Louisiana.

Status: Has temporary FPC approval.

Project: 352 miles of 30-in. loop between Louisiana and Leach, Ky.; 54 miles of 24-in. lateral in Louisiana.

Status: Filed with FPC.

Completion: 1959.

- **Houston Texas Gas & Oil Corp.**

Project: 702 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 139 miles of 18-in. and 101 miles of 20-in. from Kissimmee to Cutler, Fla.; 642 miles of 3 to 18-in. sales laterals in Florida. Main line to join Coastal Transmission's line from McAllen, Tex., to Baton Rouge.

Status: Under way.

Contractor: **Midwestern Constructors** has the 702 miles of 24-in.; **Harbert Construction Corp.** has remainder.

Completion: June 1958.

- **Humble Oil & Refining Co.**

Project: 250 miles of 26 or 30-in. from Southwest Texas area to Houston, plus 200

PIPELINE CONSTRUCTION

miles of various size gathering lines.
Status: Planned.

• **Iron Ranges Natural Gas Co.**
Project: 120 miles of 6, 12-in. from Mesabi Iron Range to northern Minn.
Status: Pending FPC approval.
Completion: November 1, 1958.
Project: 63 miles of 12-in. on north shore of Lake Superior.
Status: Pending FPC approval.
Completion: November 1, 1958.

• **Kerr-McGee Oil Industries, Inc.**
Project: 24 miles of 4-in. in Blocks 21, 22, and 32 to connect wells with its Breton Sound production island off the Louisiana coast.

• **Manufacturers Light & Heat Co.**
Project: 3 miles of 12-in. from Wellsville to a point in Saline Township, Ohio; 8 miles of 12-in. in Brook County, W. Va.; 4 miles of 10-in. in Ohio County, W. Va.
Status: Approved.

• **Michigan Consolidated Gas Co.**
Project: 67 miles of 10 and 12-in. between Sears and Travers City, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.**; Floyd Huduall, supt., office at Cadillac.
Project: 60 miles of 10 and 12-in. between Muskegon and Ludington, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.**, jointly with **H. L. Gentry Construction**, Frank Morris, superintendent, office at Hart, Mich.

• **Michigan Gas Storage Co.**
Project: 40 miles of 12-in. and 12 miles of gathering lines from Overisal field in Allegan County to Kalamazoo, Mich.
Status: Planned.
Contractor: **Bechtel Corp.**

• **Michigan Wisconsin Pipe Line Co.**
Project: 33 miles of 4, 6-in., 2 miles of 12-in., 4 miles of 10-in., and 7 miles of 8-in. gathering lines in LaVerne Field, Harper County, Okla.
Status: Planned. Pending FPC approval.
Completion: October 1, 1958.
Project: 56 miles of 20-in. extension of LaVerne line, Harper County, Okla.
Status: Planned. Pending FPC approval.
Completion: October 1, 1958.
Project: 25 miles of 12-in. and 21 miles of 24-in. loops in Wis. and Mich.
Status: Planned. Pending FPC approval.
Completion: October 1, 1958.

• **Midwestern Gas Transmission Co.**
Project: Line from Portland, Tenn., to Minnesota-Canada border near Emerson, Man.: 670 miles of 24-in., 218 miles of 20-in, 371 miles of 16-in., 115 miles of 12-in., 70 miles of 10-in., 179 miles of 8-in., 147 miles of 6-in., 174 miles of 4-in., 106 miles of 3-in.
Status: Pending FPC approval.

• **Mooki Chemical & Gas Corp.** and **Missouri Transmission Corp.**
Project: 425 miles of 16-in. from Pottawatomie County, Okla., to St. Louis. Mookl, 1341 S. Boston, Tulsa, will build Okla. section. Missouri Transmission, Springfield, Mo., will build the Mo. section.
Status: Initial FPC filing rejected. Will refile.

• **Natural Gas Pipeline Co. of America**
Project: 389 miles of 36-in. loops along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co., and 91 miles of 30-in. loops along parts of its main line.
Status: Approved by FPC examiner.
Project: 337 miles of 30-in. between Fritch, Tex., and Beatrice, Neb., and 59 miles of 36-in. between Beatrice and Joilet, Ill., along existing system.

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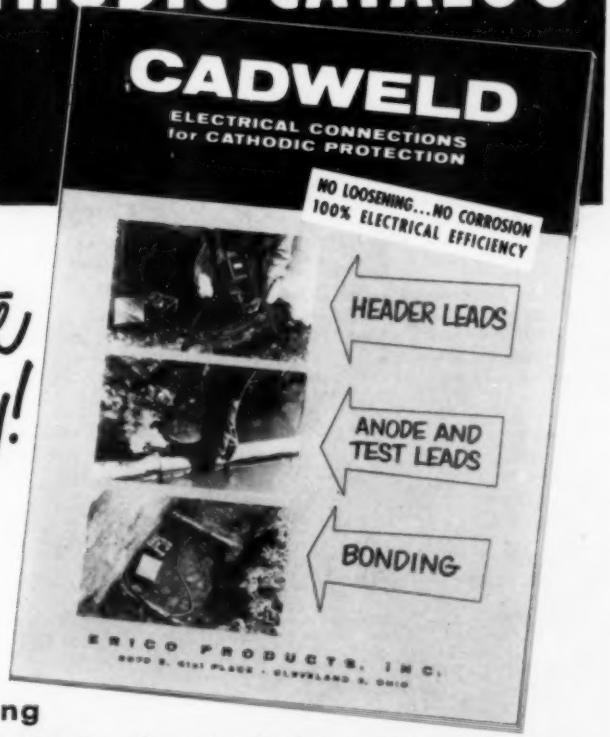

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PIPELINE CONSTRUCTION

Status: Pending FPC approval.
Completion: 1959.

• **New York State Natural Gas Corp.**
Project: Will replace 12 miles of 20-in. with 30-in. and 13 miles of 12-in. with 20-in. in Pa.
Status: Planned.

• **North Carolina Natural Gas Corp.**
Project: 630 miles of 2 to 16-in. from near Mooresville, eastwardly across N. C.
Status: Under way.
Completion: Spring 1958.

• **Northern Natural Gas Co.**
Project: 23 miles of 24-in. loops in Nebr. and Iowa; 43 miles of 30-in. loops in Kans., Nebr., and Iowa; 169 miles of 20-in. from Farmington, Minn., to Superior, Wis.; 44 miles of 16-in. in Duluth-Superior-Iron Ranges area.
Status: Pending FPC approval.
Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek fields in Alberta, Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.
Status: Proposed.
Project: 1,090 miles of 2 to 16-in. branch lines to serve communities in Minn., Iowa, S. D., Nebr., Wis.
Status: Filed with FPC March 18, 1957.
Project: 28 miles of 30-in. loop in Tex. and Kans.
Status: Has temporary approval.
Contractor: **R. H. Fulton & Co.**
Completion: Late February 1958.

• **Northern Utilities Co.**
Project: 35 miles of 16-in. in Fremont-Natrona County, Wyoming, area; 8 miles of 12-in. around Casper; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander area.
Status: Planned.

• **Offshore Gathering Corp.**
Project: 364 miles in Gulf of Mexico off Louisiana: 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in. (Dual line.)
Status: Application pending with FPC.

• **Olin Gas Transmission Corp.**
Project: Mississippi River 3 and 8-in. crossing near White Castle, La.
Status: Under way.
Contractor: **Houston Contracting Co.**, A. J. Slovack and R. E. Thornton, supts., office at White Castle.

• **Pacific Gas & Electric Co.**
Project: 138 miles of 34-in. looping of the Topock-Milpitas line.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.**
Completion: February 1958.
Project: 5 miles of 16-in., 160 miles of 12-in., 8 miles of 8-in. from Corning to Eureka, Calif.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.** and **Alex Robertson Co.**
Completion: June 1958.

• **Pacific Lighting Gas Supply Co.**
Project: 83 miles of 34-in. from North Coles Levee to Newhall, Calif.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.**
Completion: July 1, 1958.

• **Pacific Northwest Pipeline Corp.**
Project: 40-mile line from Ute Trail gas fields in northeastern Utah to its main line in western Colorado.
Status: Planned to start spring 1958.

• **Pennsylvania Gas Co.**
Project: 23 miles of 10-in. in Erie County, Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa., 30 miles of branch lines, several small distribution lines.
Status: Has FPC permit.

• **Permian Basin Pipeline Co.**
Project: 29 miles of 10-in. gathering lines from Crane and Pecos counties to McCamey, Tex.
Status: Under way.
Contractor: **Lone Star Constructors, Inc.**

• **Piedmont Gas Co.**
Project: 78 miles of 2 to 8-in. extension off Trancontinental in North Carolina to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.
Status: Has FPC approval.

• **Seaboard Oil Co.**
Project: 6 miles of 10-in. in Vermilion and Lafayette parishes.
Status: Has FPC examiner's approval.

• **Shell Oil Co.**
Project: 9 miles of 6-in. from Lake Pontchartrain to Norco, La.
Status: Planned.

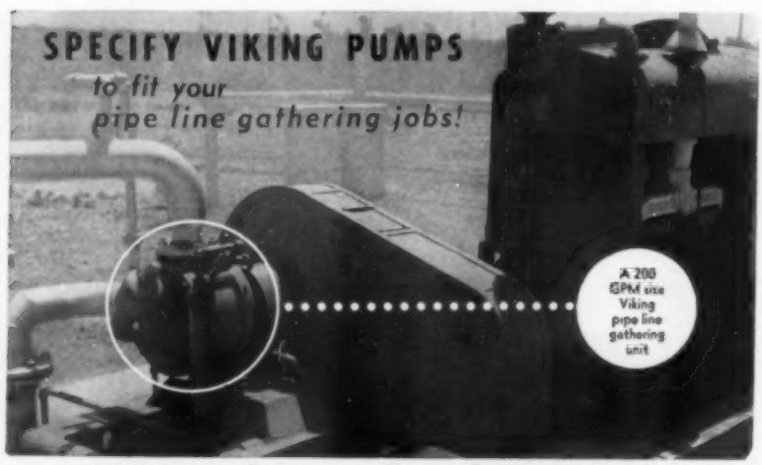
• **Southern Natural Gas Co.**
Project: 335 miles of 4 to 26-in. in southern La.
Status: Pending FPC approval.
Completion: December 1, 1958.
Project: 45 miles of 6 to 10-in. in southern La.
Status: Pending FPC approval.
Completion: December 1, 1958.
Project: 25 miles of 6 to 20-in. in southern La.
Status: Pending FPC approval.
Completion: December 1, 1958.

• **Tennessee Gas Transmission Co.**
Project: 556 miles of 30-in. from Mississippi Delta area south of New Orleans to Portland, Tenn.
Status: Has temporary FPC approval.
Project: 76 miles of 24-in. from Coudersport, Pa., to Hamburg, N. Y.
Status: Has temporary FPC approval.
Project: 163 miles of 30-in. and 101 miles of 26-in. from Portland, Tenn., to near Lancaster, Ky.; from Winchester, Ky., to Morehead, Ky.; from Catlettsburg, Ky., toward Broad Run, W. Va.; from New Wilmington, Pa., to Mercer, Pa.; and from Morehead, Ky., to Catlettsburg, Ky.
Status: Has Temporary FPC approval.
Project: 10 miles of 12-in. extension of system in Gulf of Mexico to terminate at CATC Group's Block 59 field.
Status: Under study.

• **Texas Eastern Transmission Corp.**
Project: 17 miles of 8-in. and 3 miles of 6-in. from its 20-in. Baytown-Hankamer line to Alco-Mag field in Harris County, Texas.
Status: Has FPC approval.
Project: 140 miles of 30-in. between Kosciusko, Miss., and Uniontown, Pa., 105 miles of 30-in. between Opelousas, La., and Kosciusko, 22 miles of 14-in. supply line in La.
Status: Pending FPC approval.

• **Transcontinental Gas Pipe Line Corp.**
Project: 202 miles of 36-in. and 132 miles of 30-in. main line loop; 164 miles of 24-in. to connect storage in Pa.; 202 miles of 10 to 20-in. gathering lines in southeast La.; 48 miles of 10 to 20-in. to tap gas off Tex.
Status: Pending FPC approval.
Project: 57 miles of 36-in. main line loop.
Status: Pending FPC approval. Planned for 1959.
Project: 87 miles of 24-in. laterals, plus small gathering lines connecting seven Louisiana fields with the New Orleans area.
Status: Pending FPC approval.

• **Transwestern Pipe Line Co.** (Warren Petroleum, Monterey Oil Co.; J. R. Butler).
Project: A line from Four Corners area to Calif. border.



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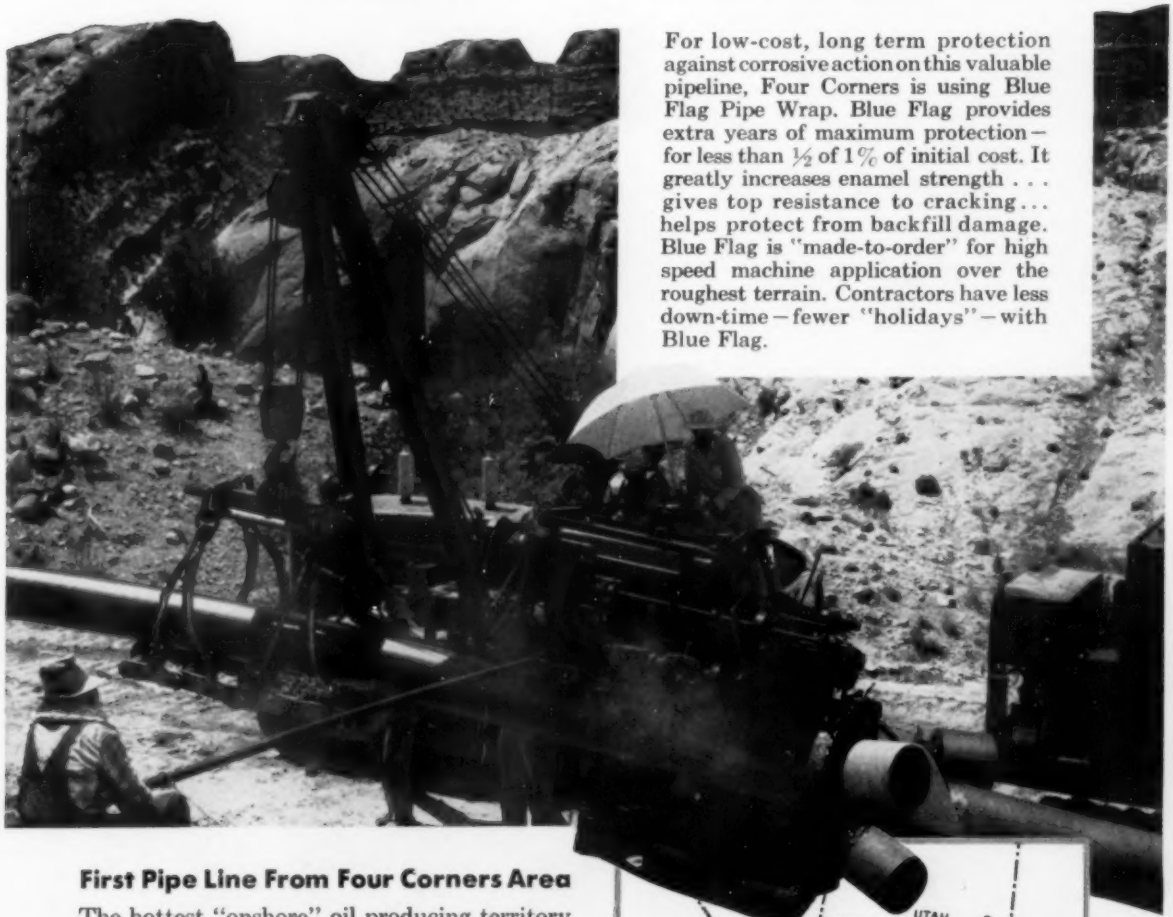

For low-cost, long term protection against corrosive action on this valuable pipeline, Four Corners is using Blue Flag Pipe Wrap. Blue Flag provides extra years of maximum protection—for less than ½ of 1% of initial cost. It greatly increases enamel strength . . . gives top resistance to cracking . . . helps protect from backfill damage. Blue Flag is "made-to-order" for high speed machine application over the roughest terrain. Contractors have less down-time—fewer "holidays"—with Blue Flag.

First Pipe Line From Four Corners Area

The hottest "onshore" oil producing territory in the country today is the Four Corners area of Utah, Colorado, New Mexico and Arizona. This prolific area is being tapped by a mammoth pipeline extending all the way to Los Angeles. Owned by six major oil companies, Four Corners Pipeline will mutually benefit oil producers in the field and the oil purchasing companies in Southern California.

For technical data on applications such as this Four Corners job, write L·O·F Glass Fibers Company, Toledo, Ohio. Dept. 78-28.

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PIPELINE CONSTRUCTION

Status: Proposed.

• **United Gas Pipe Line Co.**
Project: 18 miles of 12-in. from Lirette-Mobile line in Jackson County, south to Bayou Casottee industrial area east of Pascagoula, Miss.
Status: Approved.
Project: 202 miles of 30-in. loop from southeast Louisiana, to Mobile, Ala.
Status: Pending FPC approval.

Canadian Crude-Oil Pipelines

• **Act Oils, Ltd.**
Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Bella Coola, B. C.
Status: Request has been made for permit from the B. C. government.

• **B-A Alberta Pipe Line, Ltd.**
Project: 35 miles of 8-in. to connect Drumheller field, Alberta, with existing lines running to Edmonton.
Status: Pending approval.

• **Bituminous Oil Pipeline Co.** (Royalite Oil Co. and Can-Amera Oilsands Development, Ltd.)
Project: 250-mile line from Athabasca oil sands in northeastern Alta., to Edmonton.
Status: Long-range plans.
Completion: 1960.

• **East Coast Transmission Co.** (Pacific Petroleums, Ltd., Home Oil, Ltd., Canadian Homestead Oil, Ltd., Merrill Petroleums, Ltd.)
Project: Line from Alberta to Montreal.
Status: Proposed.

• **Gibson Petroleum Co., Ltd.**
Project: 25 miles of line from Willesden Green field to near Rimbley, Alta.
Status: Has Alberta Government approval.

• **Westcoast Transmission Co., Ltd.**
Project: Line to parallel its 650-mile, 30-in. gas line from Peace River to Vancouver, B. C.
Status: Under study.

• **Interprovincial Pipe Line Co.**
Project: 82 miles of 24-in. loops in Alta. and Sask.
Status: Planned.

• **Westspur Pipe Line Co.**
Project: 20 miles of 12-in. from Alida in southeastern Saskatchewan, to the Carnduff-Glen Ewen area to tap Cantal, Hastings, Florence, Carnduff, and Glen-Ewen fields; 34 miles of 4, 6, 8-in. gathering lines.
Status: Has requested permit from Board of Transport Commissioners.
Contractor: **Majestic Contractors, Ltd.**, Jeff Minter, supt., office in Estevan, Sask.
Completion: No date set.

Canadian Products Pipelines

• **Hydrocarbons Pipeline Co.**
Project: 800 miles of 6 and 8-in. L.P.G. line from near Edmonton, Alta., to Fort William, Ont.
Status: Has permit from Parliament of Canada. Seeking approval by Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.
Construction consultants: **Dutton-Williams Brothers, Ltd.**, and **A. D. Little Co.**

Canadian Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co., Ltd.**
Project: 637 miles of 34 to 16-in. gathering lines in Alberta.
Status: Under way.
Contractor: **Dutton-Williams Brothers, Ltd.**, has preliminary studies, design and management-engineering. **Universal Pipe Line, Ltd.**, subsidiary of Mannix, Ltd., jointly with **Marine Pipeline & Dredging Co.**, has crossing of Red Deer River near Cavendish, Alta., J. Hysuick, spread superintendent, office at Empress. **Fulton Banister, Ltd.**, has completed 17 miles of 34-in. west from Burstall, Sask., to near Cavendish, Alta., and 100 miles of 18-in. north to Bindless and Provost fields.

• **Alberta & Southern Transmission Co., Ltd.**
Project: 1,300 miles of 36-in. from Alberta to San Francisco area plus 47 miles of gathering lines.
Status: Planned
Completion: 1960.

• **Northern Ontario Pipe Line Crown Corp.**
Project: 675 miles of 30-in. from the Ontario-Manitoba border to near Kapuskasing, Ont. (part of the 2,250-mile Trans-Canada line; will be leased to Trans-Canada Pipe Line Co. with option to buy.) 360 miles from Port Arthur to Kapuskasing remains to be laid in 1958.
Status: Under way.
Contractor: **Nelen, Ltd.; Majestic Contractors, Ltd.; River Construction Corp.; Mannix, Ltd.; and Morrison Shivers, Ltd.**
Completion: November 1958.

• **Northwestern Utilities, Ltd.**
Project: 72 miles of 16-in. from Pembina field to Edmonton, Alta.
Status: Approved. Planned for 1958.
Completion: 1958.

• **Trans-Canada Pipe Lines, Ltd.**
Project: 491 miles of 30-in. from Kapuskasing to Toronto.
Contractors: Starting at Kapuskasing and going toward Toronto, **Grayco Contractors, Inc.**, has 82 miles; **Majestic Contractors, Ltd.**, has 83 miles; **Dutton-Williams Brothers, Ltd.**, has 57 miles; **Canadian Bechtel, Ltd.**, has 47 miles; **Morrison-Shivers, Ltd.**, has 62 miles; **H. C. Price Co.** and **Poole Construction Co.** has 63 miles; **Oklahoma Pipe Line Constructors** has 92 miles.
Completion: October 1, 1958.

• **Westcoast Transmission Co., Ltd.**
Project: 42 miles of 20-in. and 100 miles of 30 in. from Savanna Creek area, Alta., to Canadian-Idaho border.
Status: Planned.
Completion: November 1, 1958.
Project: Looping of present system to double capacity.
Status: Planned.

Foreign Crude-Oil Pipelines

• **Arabian American Oil Co.**
Project: 9 miles of 32-in. loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1960.
Project: 17 miles of 32-in. extension of loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1961.
Project: 9 miles of 30-in. extension of loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1960.
Project: 12 miles of 30-in. extension of loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1961.
Project: 54 miles of 30-in. loop of Safaniya-Ras Tanura line.
Status: Planned.
Completion: January 1959.
Project: 63 miles of 30 and 32-in. from Khursaniyah to Ras Tanura.
Status: Planned.
Completion: January 1960.

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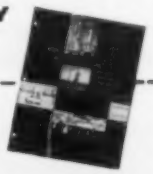

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Items of Interest to the Processing Industry

PUBLISHED BY WOLVERINE TUBE DIVISION

HOW TO LICK 3 PROBLEMS WITH 1 CONDENSER TUBE

BY ERNEST DODD

Solving three major heat transfer problems with one product is the neat trick performed recently by CALIFORNIA STEEL PRODUCTS, Division of Yuba Consolidated Industries, Inc., when fabricating a battery of six U-bend shell and tube heat exchangers for one of its West Coast customers. The units were to be used in jacket water-crude oil cooler service.

The problems: reduce unit size, slash unit costs, and increase unit service life. The product involved was electric-welded steel Wolverine Trufin® Type S/T condenser tubing in U-bend form. Here's how—and why—this product of Wolverine Tubemanship was able to help CALSTEEL accomplish its objectives.

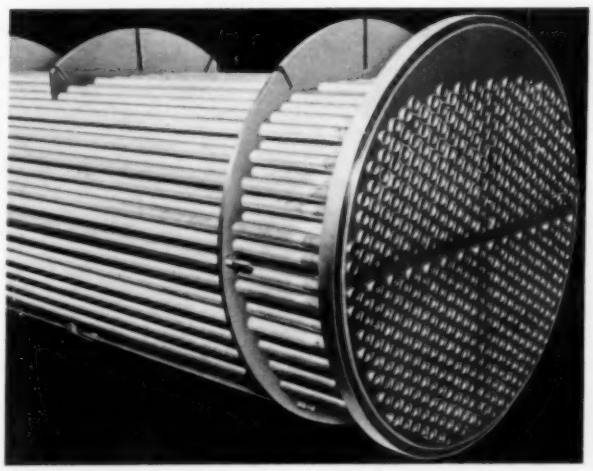
Because it is an extended surface tube with fins actually extruded from the tube wall, Trufin Type S/T has approximately 2½ times more heat transfer surface than does plain tube. It packs more heat transfer surface into a given area—permits the design of smaller and more powerful heat exchangers.

This greater surface area also means that Type S/T requires fewer tubes to handle equivalent heat duty. This means a substantial savings in direct tube costs. Fewer tubes also permit the use of smaller shells, heads and baffles with a consequent saving in material costs. This in turn brings a reduction in labor costs because of fewer rolling in operations.

Although operation of crude oil coolers is regarded as dirty service, similar applications where Trufin Type S/T electric-welded condenser tubes have been used have proven conclusively that Trufin tubed units stay on stream considerably longer than plain tube exchangers. Designers have discovered that the configuration of Trufin's extended surface is less conducive to scale build up than that of plain tube. Scaling tends to follow the contour of the fins, forming in many cases, an extended projection of the fin that contributes to self shedding. This assures reduced maintenance and increased on stream time.

In addition, CALSTEEL also helped itself to still greater savings and convenience when it specified Trufin Type S/T in U-bend form.

Wolverine pre-fabricates its U-bend condenser tubes to customer specifications—ships them in the exact order of their installation in disposable pallets. All the user has to do is insert them directly into the unit. This reduces inventory, saves floor space and cuts downtime.



Your company, too, can realize similar savings in money, time and convenience by specifying Wolverine Trufin Type S/T condenser tube. Next time you retube existing equipment or consider the design of new units, be sure to specify *Trufin*.

SEND FOR FREE BOOK

Wolverine's Trufin Catalog is filled from cover to cover with valuable information concerning integrally finned condenser tube. Processing engineers and design engineers alike will find here one of the most comprehensive sources for such finned tube data as types, sizes, alloys, end finishings, fabrication techniques, standards, and applications. Write for this valuable book today!

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For the convenience of its customers Wolverine Tube maintains sales offices in the cities listed below. You'll find the addresses and telephone numbers listed in the yellow pages of your telephone directory. For complete information about Wolverine Trufin or other Wolverine products just call the sales office nearest you:

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COLUMBUS, OHIO
DALLAS, TEXAS
DAYTON, OHIO
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Remember that this versatile condenser tube is available in a wide range of sizes, types and alloys in copper, aluminum and electric welded steel. It is also available in low fin form (Type S/T) for shell and tube applications and with high fins (Types H/A, H/R, L/C, I/L) for air cooled operations.

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- **Atmospheric section**
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- **After coolers**
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- **Propane condensing**
- **Debutanizer condenser**
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- **Methylchloride condensing**
- **Phenol cooler**
- **Ethyl chloride condensing**
- **Butalene condensing**
- **Freon condensing**
- **Toluene reboiler**
- **Iso Butane condensing**
- **Coolers**
- **Oil to Oil**
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- **Inter-cooler**
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- **Oil heater**
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Wolverine Trufin is available in Canada through the Unifin Tube Co., London, Ontario.

PIPELINE CONSTRUCTION

• **Assam Oil Co.**
Project: 600 miles of 20-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.
Status: Survey of possible routes under way.
Contractor: **Pipe Line Engineering Co.** is making survey.

• **Bolivia-Paraguay.**
Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.
Status: Planned .
Contractor: **Five Lilles,** a French Combine.

• **Burmah Oil Co., Ltd.**
Project: 250 miles of 20-in. from Barauni to Calcutta, India, extending Assam Oil Co.'s proposed line.
Status: Survey under way.
Contractor: **Collins Construction Co.** is surveying locations for some 40 river crossings.

• **Caltex**
Project: 30 miles of 30-in. from Duri field in Sumatra to Dumai where a deepwater terminal will be built. Line will be extended 35 miles to Minas field later.
Status: Under way.
Contractor: **Bechtel Corp.**
Completion: May 1958.

• **Cia. Shell de Venezuela**
Project: 34 miles of 16-in. from Boscan to site of a planned terminal at Puerto Miranda, Venezuela.
Status: Planned.
Contractor: **Williams Brothers Sudamericano, Ltd.**

• **Colombian Petroleum Co.**
Project: 42 miles of 6-in. from Tibu field to Rio de Oro in Colombia.
Status: Under way.

• **C.R.E.P.S., Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN Repal), and Cie. Francaise des Petroles Algerie**
Project: 450 miles of 16-in. from Edjele field in southeastern Algeria to a Mediterranean port on the Libyan coast.
Status: Pipe has been ordered.

• **Creole Petroleum Corp.**
Project: 100 miles of 30-in. from Temblador field to Caripito in Venezuela.
Status:Under way.
Contractor: **Pipe Line Engineering Co. and Oklahoma Pipe Line Constructors,** R. J. O'Connell, supt., office at Maturin.
Completion: April 30, 1958.

• **Elburz Oil Corp.**
Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.
Status: Planned.

• **Iranian Oil Participants, Ltd.**
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bandar Mashur line.
Status: Planned.
Project: 50 miles of 26, 28-in. from Gach Saran field to new terminal at Kharg Island in the Persian Gulf.
Status: Planned.
Contractor: A joint venture of **Raymond Concrete Pile Co.** and **Williams Brothers Co.** of Tulsa; **Richard Costain, Ltd.,** and **John Brown, Ltd.,** of Britain; **Werkspoor & Bredoro** of The Netherlands.

• **Iraq Petroleum Co.**
Project: About 600 miles of up to 40-in. from Kirkuk field through Iraq to Turkish port of Iskenderun on the Mediterranean.
Status: Proposed. Survey completed.

• **Mene Grande Oil Co.**
Project: 97 miles of 30-in. from fields in Eastern Venezuela to Puerto La Cruz.
Status: Under way.
Contractor: **Fulghum Contracting Corp.** has 22 miles between Oficina and Anaco. **Williams Brothers Co.** has remainder.
Completion: First quarter 1958.
Project: 45 miles of 24-in. from Oficina to Melones, Venezuela.
Status: Planned.
Completion: First quarter 1958.

• **Middle East Pipeline**
Project: 1,500 miles of 38 and 40-in. line from Persian Gulf to Mediterranean at Iskenderun, Turkey.
Status: Proposed.

• **North-West Oil Pipeline Co.** (newly formed by six West German refiners, headed by affiliates of Standard Oil Co. (N.J.), and British Petroleum Co., Ltd.)
Project: 230 miles of 28-in. from refining centers in the industrial Ruhr area of West Germany to Wilhelmshaven.
Status: Work to start early 1958.
Contractor: **W. M. Lyles** in joint venture with two German steel firms.
Completion: November 1958.

• **Royal Dutch-Shell**
Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through Eastern France, Luxembourg, West Germany, Netherlands, and Belgium. Main trunk to be 30-in.
Status: Company is considering project together with several other companies.

• **SOPEG** (Cie. Francaise de Petrole (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie)
Project: 300 miles of 24-in. from Hassi Messaoud field in the Algerian Desert to Bougie on the Mediterranean Coast.
Status: To start fall 1958.
Contractor: **Entrepose Co.** jointly with **Ste. Parisienne pour Industrie Electrique.**
Completion: 1959.

• **Union of Soviet Socialist Republic**
Project: 2,300-mile Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.

• **Yacimientos Petroliferos Fiscales** (Argentina)
Project: 932 miles of 12-in. from Campo Duran to San Lorenzo.
Status: Planned.
Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.)
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: To start 1st quarter 1958.
Completion: Mid-1960.

• **Yacimientos Petroliferos Fiscales Bolivianos**
Project: 174 miles of 10-in. and 44 miles of 8-in. from Sicasica, Bolivia, to Arica, Chile.
Status: Planned.
Contractor: **Williams Brothers Co.** and **Telescopic Pipe Line.**
Completion: October 1958.

Foreign Products Pipelines

• **Empresa Nacional de Petroles** Government of Chile and Cia de Petroles de-Chile (Copec), et al.
Project: 75 miles of 10-in. from Chile's coastal refinery at Concon to Santiago.
Status: Under way.
Contractor: **Williams Brothers.**
Completion: 1958.

• **National Iranian Oil Co.**
Project: 90 miles of 12-in. from Abadan to Ahwaz, Iran.
Status: To start spring 1958.
Contractor: **Entrepose Co.,** Paris.
Completion: Summer 1958.

• **North Atlantic Treaty Organization**
Project: 2,000 miles of lines to airfields in parts of Europe.

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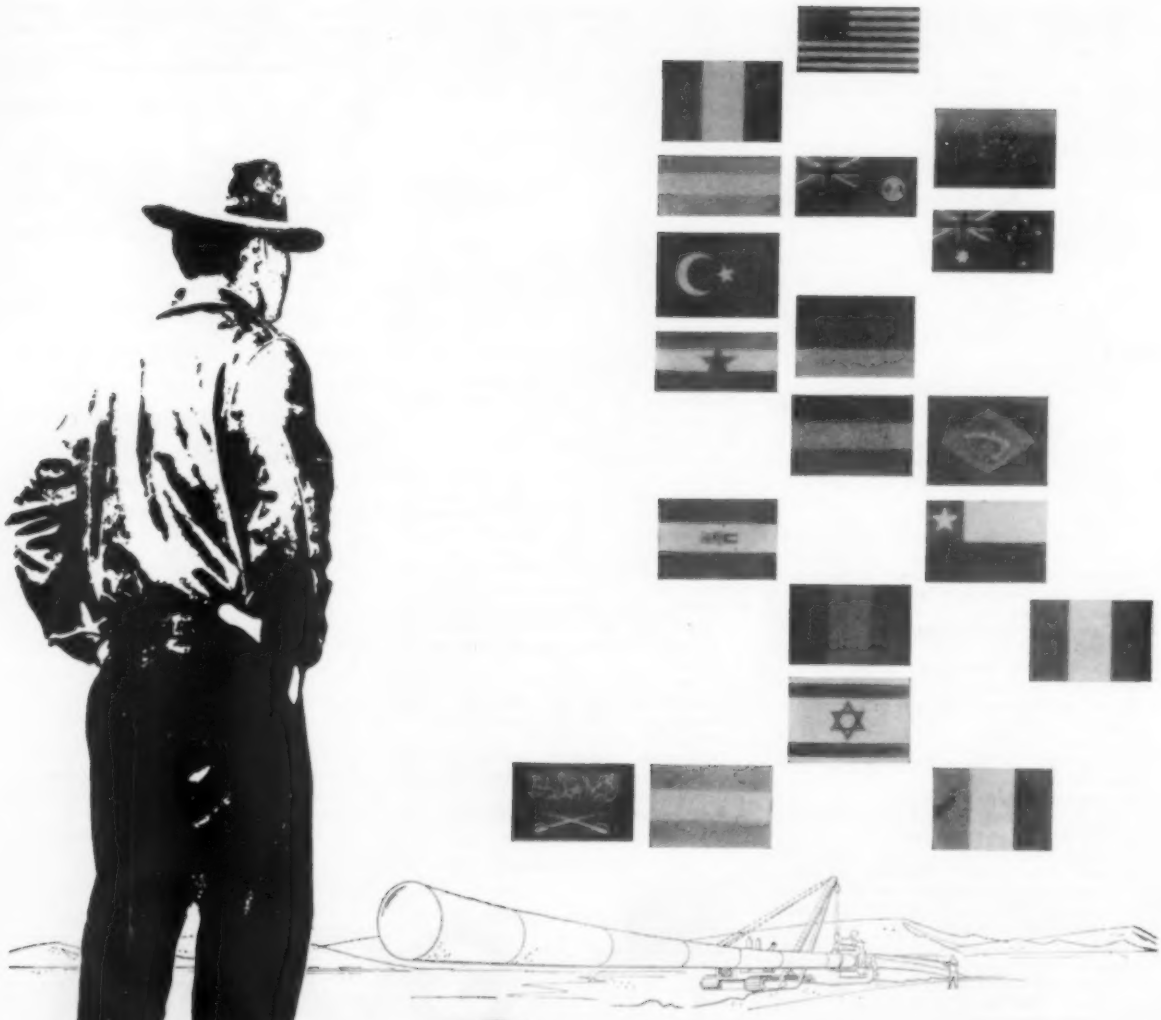

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PIPELINE CONSTRUCTION

Status: Under way.

Contractor: **Associated Pipeline Contractors, Inc.** (450 miles from Iskenderun, Turkey, to Batman); **TECHINT** (205 miles of 4-in. from Bandirma to Eskisehir, Turkey, and 250 miles of 8-in. from Antalya to Eskisehir).

Foreign Natural-Gas Pipelines

- **Attock Oil Co.**

Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.

Status: Planned.

- **City of Riyadh, Saudi Arabia**

Project: 182 miles of 10-in. from Ghawar field to Riyadh.

Status: Planned.

- **Cuban Gas Transmission Co.**

Project: 650-mile pipeline from Campeche area of Mexico across Yucatan and on the ocean floor to Havana, Cuba; 150 miles would be submarine.

Status: Being studied by Ebasco Services.

- **Gaz de France**

Project: 550 miles of 16 to 24-in. from Lacq field, southwestern France, to Paris, plus a 10-in. terminal to Nantes and 12 to 16-in. laterals to Lyons, making a 1,000-mile system.

Status: Under way.

Contractor: French contractors.

Completion: First stage in 1958; complete system in 1960.

- **NIOGAS**

Project: 160 miles of 6, 8, 10, and 12-in. from Fischamend field to Vienna and other Austrian cities.

Status: Under way.

Contractor: **Williams Brothers Co.** and **Costain-John Brown, Ltd.**

Completion: Fall 1958.

- **North Thames Gas Board**

Project: Will extend its Shellhaven-to-Romford line to Coryton then to Canvey Island.

Status: Planned.

Completion: Summer 1958.

- **Petroleos Mexicanos.**

Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.

- **Sui Gas Transmission Co.**

Project: 310 miles of 16-in. from Sui gas field to Moultan, Pakistan.

Status: Under way; to be extended later to Lahore with branches at Kot Addu, Jhang, Magiana, and Montgomery.

Contractors: **Pakistan Constructors,** a joint company of **Morrison-Knudsen** of Boise, Idaho, and **William Press, Ltd.,** of London.

Project: 145-mile line from Sylhet to Dacca, East Pakistan.

Status: Under consideration. If approved construction could start December 1958.

- **Technical Office of Hydrocarbon, Ministry of Mines and Petroleum, Government of Venezuela.**

Project: 207 miles of 26-in. from Anaco fields to Caracas.

Status: Under way.

Contractor: **Williams Brothers Co.** has part.

Completion: Spring 1959.

- **Union of Soviet Socialist Republic.**

Project: 808 miles of 26-in. from Stavropol in the Northern Caucasus to Moscow, to serve Voroshilovgrad, Voronezh, Tula, Yelets, and Serpukhov.

- **Yacimientos Petroliferos Fiscales (Argentina)**

Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.

Status: To start first quarter 1958.

Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.)

Completion: Mid-1960.

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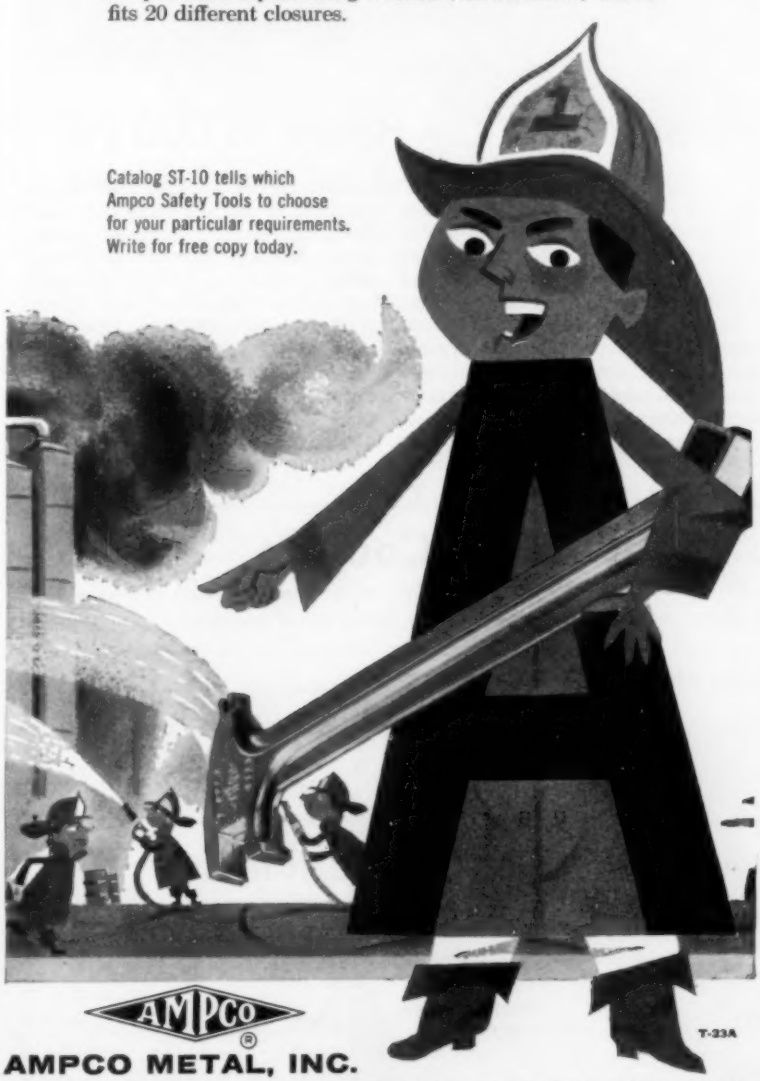

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All discharge-manifold valves and controls are within easy reach of the operator. A rear discharge from each pump allows clean hookups. Air-operated, large-opening tank valves keep down suction restriction. The truck has a short wheelbase that permits good maneuverability in tight locations. **Write or call: Byron Jackson Service, Inc., Div. of Borg-Warner Corp., 6505 Paramount Boulevard, Long Beach 5, Calif., for details on Model 114-T service truck.**

Meter-Separator Handles 50,000 Bbl. Per Day

Trade-named Hi-Cap, the metering separator handles high individual or combined flows. Too, it handles low-gravity, viscous crudes easily at viscosities to 100,000 S.U.s. or higher and crudes with high gas entrainment. Crudes with high, variable gas entrainment are metered by weight. The parallel dump type of meter chambers used fill quickly, and no time is lost while one meter dumps. The parallel meter chambers continuously meter all oil produced.

Either electric or pneumatic-instrument systems are available to meter oil by weight in addition to volume. The metering separator comes in diameters of 36 through 60 in. Larger diameters are available on special order. **Write or call: Rolo Mfg. Co., P. O. Box 6763, Houston 5, for details on Hi-Cap meter-separator.**

●

Water-flood Meter Operates At 2,000 psi., 150° F.

This new Neptune 1-in. water-flood meter is designed specially for high-pressure metering of corrosive saline water being pumped into underground oil recovery projects. The

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

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.....

Described in THE OIL AND GAS JOURNAL - Issue of February 3, 1958

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COMPANY.....

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meter's corrosion-resistant nickel-alloy measuring chamber and nickel-alloy gears, pinions, and spindles assure long, accurate service under demanding field conditions, according to the maker.

Meter capacity is 70 bbl. per hour maximum and 7 bbl. per hour minimum. A straight-reading type, the register has a totalizer capacity of 999,999 bbl. Couplings can be obtained with a tailpiece having 1-in. pipe threads.

Only one part of the meter in the measuring chamber moves. Water surrounds the measuring chamber at line pressure. This is said to eliminate one cause of distortion.

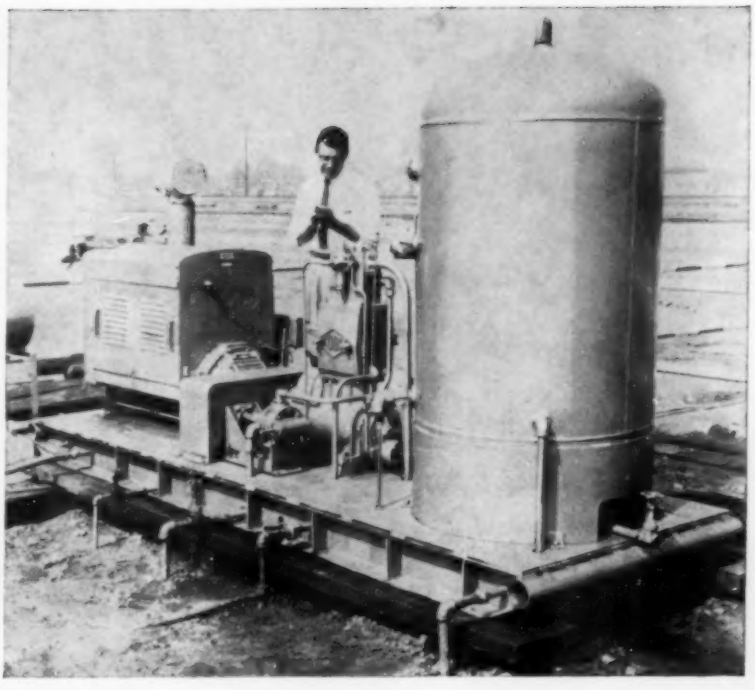
Meter dimensions are: height 9¼ in.; length 10¾ in.; and width, 7½ in. Distance from the base to the centerline is 2⅞ in. The meter weighs 32 lb. **Write or call: Neptune Meter Co., 19 West Fiftieth Street, New York 20, for details on 1-in. waterflood meter.**

●

Aluminum Pipe Protected From Corrosion

Coated with baked polyurethane plastic, the aluminum pipe is suitable for use under highly corrosive conditions such as those in salt-water-disposal lines, according to the maker. Primarily designed for oil-industry use, the aluminum pipe's coating has efficient flow characteristics and is highly resistant to salt water, acids, caustics, crude oil, and other corrosive agents, the maker reports. Its outstanding bonding qualities and high degree of flexibility provide long service life.

The coated aluminum pipe is available in Schedules 5, 10, and 40. **Write or call: Kaiser Aluminum & Chemical Sales, Inc., 191 N. Michigan Street, Chicago 11, for details on plastic-coated aluminum pipe.**



Hydraulic Pump for Single Wells

Called the Kobe Solo (single oil-well operation), it is designed as a packaged surface unit to allow "well-by-well" equipping of a lease until the final central power plant for multiple-well operation can be planned and installed. The down-hole Kobe free-pump system is permanent.

The single-well feature allows conventional gaging of well production. The free-pump feature provides the convenience of bottom-hole pressure data and the ability to change pump size. The mobility and well-testing features of the unit are said to provide an ideal solution to the problem of equipment planning for the uncertain well or lease.

The packaged unit does away with temporary pumping set-ups and later changeovers. Instead, a field can be equipped at the outset with hydraulic pumps. The unit consists of a Size 2 Kobe triplex high-pressure hydraulic pump and a small power-oil reservoir tank. A gas engine or electric motor is optional.

Skid-mounted, the pump package needs little space and no pad. Assembled, piped, and painted at the factory, it requires only a simple field hookup before operation. For well depths to 15,000 ft., the unit handles volumes up to 400 bbl. per day. **Write or call: Kobe, Inc., 3040 East Slauson Boulevard, Huntington Park, Calif., for details on Solo pumping package.**

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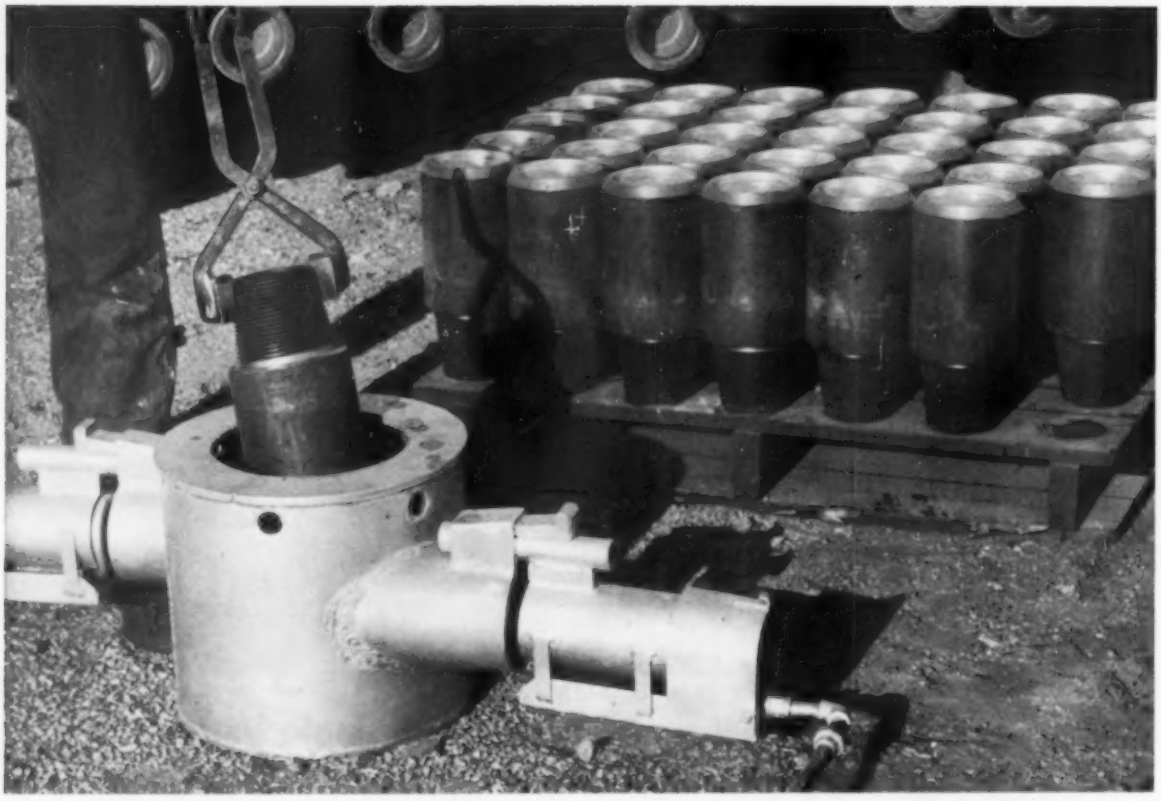

Heating Straight Grip tool joints in American Iron's self-contained portable furnace, at field-installation.

How American Iron "Straight Grip" tool joints increase your drill string efficiency!

In those areas where tool joints must be replaced before the drill pipe is retired or where tool joints outlast the drill pipe, American Iron hand-applied Straight Grip tool joints are your best investment.

The most advanced design in a tool joint, the Straight Grip offers FOUR-POINT SEAL protection against joint leakage and creep . . . seals actually become tighter as pump pressures increase. When replacements are necessary, the job is done quickly, efficiently right at your rig.

Features that make Straight Grip your best tool joint buy:

- FOUR points of fluid seal!
- Tighter seal as tension load and pump pressure increases!
- Three times as strong as the pipe they connect!
- Positive protection against joint leakage!
- Require no selective fitting to drill pipe!
- Quickly, easily removed and installed at your location!

Straight Grip—the hand-applied tool joint with exclusive

4-POINT SEAL PROTECTION

- Stabilizer Seal
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- Inside Cylindrical Seal
- Shoulder Seal

Only Straight Grip Tool Joints are capable of handling high tensile drill pipe!

Send for free brochure entitled "Principles of American Iron Straight Grip Tool Joints" and see why Straight Grip is your only practical hand-applied tool joint in operation today!

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Flexible Shaft for Pipe Machines

Providing increased visibility of work, the flexible shaft is an addition to the line of accessory equipment available for H&M pipe-cutting and beveling machines. It is made from a length of flexible tubing. A crank handle attaches to one end. The other end attaches to the crank pinion on the machine. Turning the crank puts the ring gear in motion and revolves the torch around the pipe.

This attachment is especially useful when cutting or beveling large-diameter pipe. It lets the operator stand in any position and observe the cut around the full circumference of the pipe. **Write or call: H&M Pipe Beveling Machine Co., 311 East Third Street, Tulsa, for details on flexible shaft.**

●

New Centralizer Has Cage, Rigid Features

Named the Gilover Special, the tool is built along conventional cage-centralizer lines to achieve high centering efficiency. But features of the rigid type of centralizer are employed to provide a positive-clearance block, a small wedge between the spring and collar to prevent the springs from pressing flat. This feature is said to assure effective

L-P GAS TESTING EQUIPMENT

Tests . . .

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VAPOR PRESSURE BOMB

Designed for NGAA Method No. 2140 requirements. Used for the determination of the gauge vapor pressure of liquified petroleum gas products. This apparatus consists of a bomb having two sections, or chambers. An upper 80% capacity chamber and a lower 20% capacity chamber. A bleeder valve, inlet valve, and a quick opening chamber separating valve are included. Bomb and gauge connections use "O" ring seals permitting hand tightening. Each bomb tested to 500 psi. Range 0-300 lbs.

CORROSION TEST BOMB

Tests the corrosiveness of LP gases. An all stainless steel bomb for corrosion tests by the copper strip method. Sealed by a neoprene "O" ring which makes it possible to make the bomb pressure tight with the hands and without wrenches. Complete with two nickel plated valves, connecting hose with swivel connections, adapter to ¼-inch pipe.

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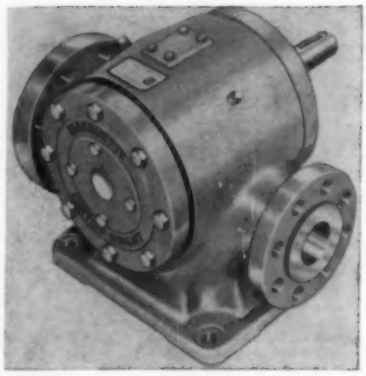
clearance for cementing under all conditions.

Other features include: (1) short, springs for high strength and centering power, (2) a special nonstress weld to join the collar and spring, (3) free-moving collars that do not clutch or grip, and (4) pin-lock hinges. **Write or Call: Gilover Tool Co., Inc., 502 N. Sam Houston Street, Odessa, Tex., for details on Gilover Special Centralizer.**

Vane Pump Built For Gathering Lines

Delivering 170 bbl./hour at 600 psi., the Model 2000 vane type of rotary positive-displacement pump has been tested and approved on gathering lines in Louisiana, Texas, Oklahoma, and Kansas, the maker reports. It is also expected to give excellent performance in other applications where the liquid is at least as viscous as kerosine or light engine oil and inlet conditions are consistent with the characteristics of the liquid.



The pump delivers a nonpulsing flow at a rate which remains fairly constant as the outlet pressure varies. If the liquid does not vaporize, the pump will operate under vacuum conditions. Its noise level is low.

Capacity of the pump can be easily varied by changing sleeves. This takes only 20 minutes. According to the maker, the vanes can be replaced in 15 minutes. Only half an hour is required to replace the rotor, shaft, sleeve, seal, and bearing assembly. These maintenance operations can be performed without disconnecting or moving the pump.

The manufacturer recommends that the pump be operated at 1,200 r.p.m. with a limit of 60 hp. and 600 psi. outlet pressure above inlet pressure. **Write or call: Marquette Div., Curtiss-Wright Corp., 1145 Galewood Drive, Cleveland 10, for details on Model 2000 pump.**

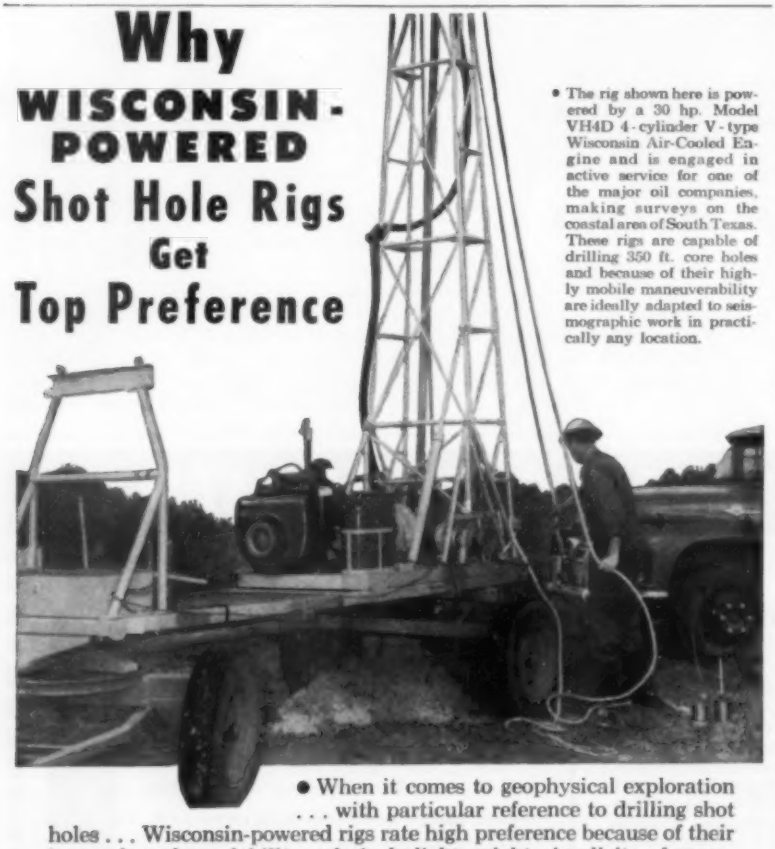
●

Oil-Field Chemical Stops Gyp Deposits

Suited for both primary and waterflood wells and catalogued as 15-J, the new pellet-form stabilizing agent is a controlled-solubility phosphate. It is specially formulated to prevent mineral deposits in: (1) the well bore, (2) flow channels adjacent to the well bore, and (3) such downhole equipment as pumps, rods, and screens.

When properly applied with a bypass feeder, it sets up a continuous built-in water-conditioning system within the well, the maker reports. Gathering lines, surface equipment, and treating tanks can be protected by installing a similar feeder ahead of the point where scale builds up. The product is a fused sodium calcium phosphate glass that is green in color, odorless, nontoxic, and nonhygroscopic. **Write or call: Calgon Co., Dept. 241, Box 1346, Pittsburgh 30, for details on 15-J.**

Why WISCONSIN-POWERED Shot Hole Rigs Get Top Preference



• The rig shown here is powered by a 30 hp. Model VH4D 4-cylinder V-type Wisconsin Air-Cooled Engine and is engaged in active service for one of the major oil companies, making surveys on the coastal area of South Texas. These rigs are capable of drilling 350 ft. core holes and because of their highly mobile maneuverability are ideally adapted to seismographic work in practically any location.

• When it comes to geophysical exploration . . . with particular reference to drilling shot holes . . . Wisconsin-powered rigs rate high preference because of their heavy-duty dependability, relatively light weight, simplicity of operation and servicing, High Torque Performance characteristics and all-weather AIR-COOLING.

The Wisconsin Engine will keep slugging away in any climate, in any weather, at temperatures ranging from low sub-zero to 140° F. Trouble-free AIR-COOLING makes the difference! And when it comes to serviceability, Stellite exhaust valves and valve-seat inserts, in combination with positive-type valve rotators, increase valve life up to 500% . . . with a comparable reduction in servicing.

If you have a power job within a 3 to 56 hp. range, let a Wisconsin Heavy-Duty Air-Cooled Engine handle it. Write for Engine Bulletin S-223.

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SHOWCASE . . .

New Literature

Seven Keys to Welding Profit is the title of new eight-page, two-color booklet Form D761. Pointing out the seven key factors that make the use of welders profitable, the booklet stresses: reliable power, two steady arcs, dual controls, parallel power, diesel economy, portability, and dealer service. **Write or call: Caterpillar Tractor Co., Peoria, Ill., for booklet Form D761.**

●

Axial-Flow Positive-Displacement Blower for compression and vacuum service is described in new four-page, two-color Bulletin CB-157. The blower-compressor capacity ranges from 85 to 3,342 c.f.m. The bulletin includes a table of engineering data for eight models and performance curves for three models. The curves show brake horsepower and capacities in cubic feet per minute for selected speeds and six pressures—3, 5, 7, 10, 12, and 15 psig. A table gives speed range and dimensions of each model as well as cubic feet per minute and brake horsepower at pressures of 5, 10, and 15 psig. **Write or call: CycloBlower Co., 132 South Pershing Avenue, York, Pa., for Bulletin CB-157.**

●

Flow Colorimeter Bulletin 4000 gives descriptions and specifications for the Beckman Model 77 flow colorimeter and for a new ratio-recording flow colorimeter. The instruments described continuously measure color intensity, turbidity, or chemical concentration in a variety of process streams. These include the clarity of lubricating oils and chemicals. Photographs and detailed drawings illustrate the instruments and typical installations. **Write or call: Beckman Instruments, Inc., Process Instruments Div., 2500 Fullerton Road, Fullerton, Calif., for Bulletin 4000.**

●

How to Measure Your Filing Costs and Efficiency is a 28-page manual that's a handy guide for measuring costs and results along with a detailed plan of action to improve filing efficiency. Among the practical tools provided are formulas for measuring "finding efficiency," "filing reference rate," and "file-clerk efficiency." A list of 19 check points is included to help management uncover the strengths and weaknesses of the filing operation. Five simple rules for file economy will help obtain top efficiency from the filing system. **Write or call: Remington-Rand Div., Sperry Rand Corp., 315 Fourth Avenue, New York 10, for Filing Costs and Efficiency manual.**

●

Selecting and Sizing Temperature-Control Valves are discussed in new six-page Bulletin 655. The bulletin tells how to select proper body material and valve trim. Detailed, but simple, formulae and examples show how to assure proper valve sizing that's essential to accurate control. The bulletin lists information needed by manufacturers to furnish proper valves. **Write or call: Jordan Industrial Sales Div., OPW Corp., 6013 Wiehe Road, Cincinnati 13, for Bulletin 655.**

●

Parallel-Entry Numerical Data Printers for computers, production testing, data-reduction systems, weighing applications, laboratory instrumentation, and process-control logging systems are described in new Brochure S-101. The eight-page illustrated brochure gives complete technical information on three read-out machines with 5 decades of input capacity, 8 decades and 11 decades, respectively, to handle 85 per cent of data-printing requirements. **Write or call: Clary Corp., 408 Junipero Street, San Gabriel, Calif., for Brochure S-101.**

●

Filtration Equipment for micronic clarification of all types of fluids is discussed in a new catalog. Applications include lubricating and fuel oils; petrochemicals; compressed air, carbon dioxide, and other gases; hydraulic fluids; coolants, and insulating oils. Filters are designed for high or low flow rates and pressures. Their container metals and elements handle solutions of varying pH, temperature, and viscosity. The catalog describes and illustrates each type of filter. **Write or call: Commercial Filters Corp., 2 Main Street, Melrose, Mass., for Fulflo and CFC Filtration Equipment catalog.**

●

Constant-Flow Control Valve Bulletin explains design, construction, and performance characteristics of the Kobe diaphragm type of nonlubricated valve for use where pressure fluctuates in a fluid line. Working pressure is 5,000 lb. Flow rate is 45 g.p.m. **Write or call: Kobe, Inc., Huntington Park, Calif., for details on constant-flow control valve.**

Tennessee's Copper Chloride was developed to effect efficient Mercaptans removal.

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Reduce Turbulence
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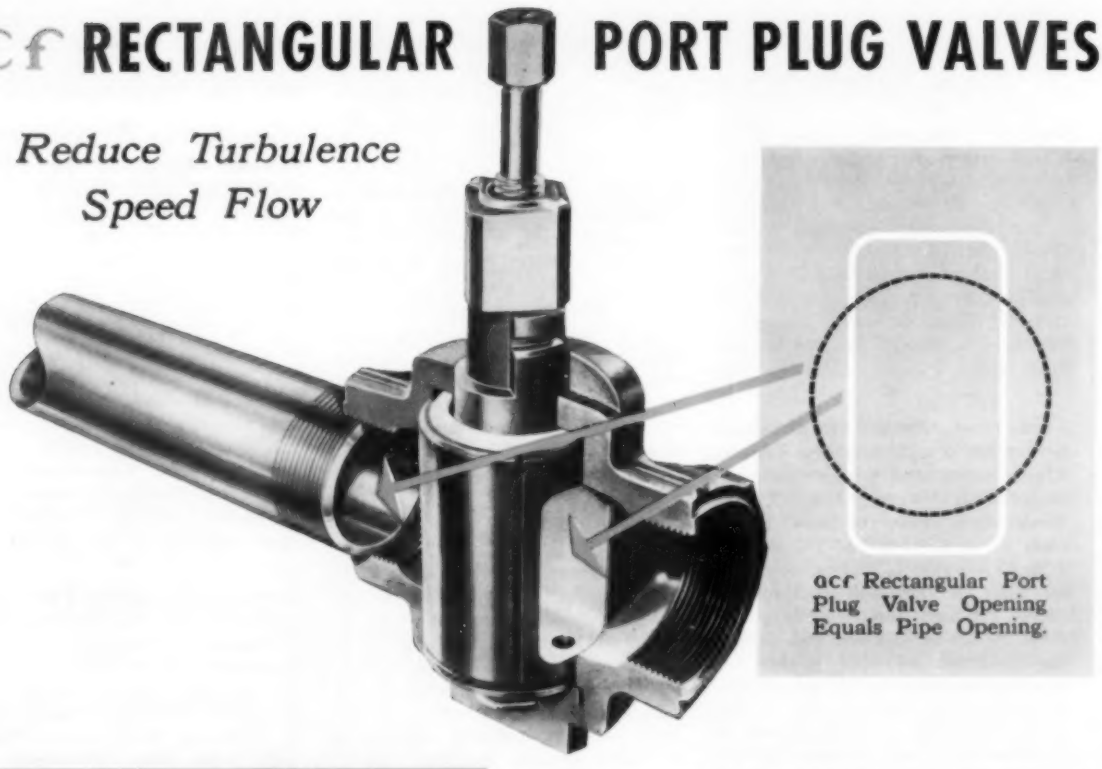
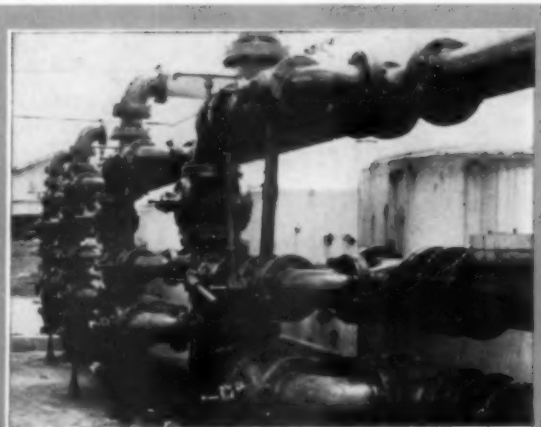


acf Rectangular Port Plug Valve Opening Equals Pipe Opening.



acf Lubricated Plug Valves in highly corrosive salt water disposal service.

2" and 4" acf Lubricated Plug Valves on manifold handling flow from 14 wells.

Rectangular ports of acf® Lubricated Plug Valves are sized and shaped to provide the nearest approach to the flow efficiency of the pipe itself and still retain the most compact plug valve design.

In addition, the entrance chamber into the port is designed to permit the flow of fluid from pipe through plug with the least amount of turbulence and loss of head pressure.

Maximum flow efficiency is but one of the advantages you receive when you specify acf Lubricated Plug Valves. Others are: tight sealing without wedging or sticking—Teflon* head gasket—quick, quarter-turn opening and closing—precision lubrication—knife-edge shearing action of the plug. They all add up to low maintenance, long life for the industry's finest lubricated plug valve.

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4710

Marshall, Boston Added to Dresser Division . .

as general markets sales representatives. William J. C. Marshall, Jr., has been named to cover the New England states and C. E. Boston for northern California and western Nevada, according to F. G. Fabian, Jr., general manager, Dresser Manufacturing Division, Bradford, Pa., one of the Dresser Industries.

Marshall was formerly with Red Hed Manufacturing Co., Boston. Formerly Boston was with Fenestra, Inc., and Revere Copper & Brass, Inc.

Wheland Co. Appoints Lee O'Shields . .

as serviceman in Oklahoma City. He succeeds William Earl Shorts, who has retired after 25 years in the Oklahoma oil fields.

Mid-Continent Supply Completes Foreign Stores . .

at Estevan, Sask., Canada, and Maracaibo, Venezuela. Both stores carry complete stocks of oil-field supplies and equipment, according to Ken W. Davis, president of Mid-Continent Supply Co.

The new building at Estevan replaces the mobile field store which had been serving the area since 1956. Store manager at Estevan is B. J. Dickey, and district manager is C. W. Crabtree. Division manager is R. L. Harris.

The new Maracaibo store, located in western Venezuela, is the second store to be opened in that country, the first being opened at Anaco in 1956. The new store is under the direction of Maracaibo Manager O. G. Garner. Venezuelan manager is J. W. Davis at Caracas.

Mid-Continent Supply Co.'s Estevan, Sask., store with Store Manager B. J. Dickey inset.

Mid-Continent's new Maracaibo store with Maracaibo Manager O. G. Garner inset.

R. Z. Mendenhall Named Macco Sales Manager . .

to direct the firm's over-all sales effort. For the past 6 years Mendenhall has been district manager at Corpus Christi for Guiberson Corp. He has had many years' experience with oil production in Illinois, Indiana, California, West Texas and New Mexico.

J. F. Pritchard & Co. Appoints K. G. Holdom . .

manager of the eastern district with offices in New York City.

Holdom replaces A. B. McClelland who will become an executive of the Siboney Caribbean Oil Co. with headquarters in New York.

Refinery Engineering Co. Promotes N. H. Illian . .

NEIL ILLIAN

to chief project manager. He succeeds Harold F. Koons, who recently was named sales development engineer to head a newly created group in the Treco sales department. Illian has been project manager of the $10-million expansion program at D-X Sunray Oil Co. in Tulsa, on which Treco is prime contractor. Illian moved to Refinery Engineering Co. in 1955 from Blaw-Knox Co.'s chemical plants division in Tulsa. He was project engineer there 4 years, later becoming assistant chief engineer. Previously, Illian had been an engineer in the design section of Phillips Petroltum Co. and in the engineering and construction department for Jones & Laughlin.

Treco designed, engineered and is constructing a 2,500-bbl. butane isomerization unit at the 75,000-bbl. D-X Sunray refinery in Tulsa.

National Supply Co. Opens Tenth Louisiana Store . .

near Leeville, Lafourche Parish. The store, on Highway 1 between Golden Meadow and Grand Isle, will serve land and offshore operators. Previous-

ly this area was served from the Houma store.

Leroy W. Snell, Jr., is store manager, under supervision of L. A. J. Monroe, district manager of the New Orleans district.

Johnston Testers, Inc. Names Bruce Deters . .

BRUCE DETERS

service manager, export department, Houston. He has been with Johnston 19 years. In his new position Deters reports to W. F. (Bill) Bettis, vice president in charge of export. Deters was with Shell Oil Co., Petroleum Securities Co. and Kettleman North Dome Association before joining Johnston in Louisiana in 1939. Since that time he has specialized in field management and in equipment design and development. Deters was assistant manager of operations prior to his recent appointment.

Jetwell, Inc., Organized By W. L. Carwile . .

to engage in oil-well perforating, radioactivity, logging and other wireline services. Headquarters are in the Mayo Building, Tulsa. District offices are being established in Shawnee, Okla., and Winfield, Kans.

Carwile, who recently resigned as vice president of Welex, Inc., after being with that firm 9 years, has had 24 years' oil-field experience.

Weatherford Oil Tool Co., Inc., Promotes Seven . .

according to Jess E. Hall, Jr., president. Homer Longino has been appointed vice president in charge of sales, and Bill Louderback will be assistant vice president in charge of sales.

HOMER LONGINO B. LOUDERBACK

Robert O. Isham of Fort Worth, assistant finance officer, is now vice president in charge of finance for Weatherford Oil Tool Co., Ltd., with

R. O. ISHAM R. P. TURNBULL

headquarters in Edmonton, Alta., Canada. Robert P. Turnbull has been named vice president of sales for Weatherford, Ltd., in Edmonton. Formerly he was sales and service engineer in the Houston area.

GARLAND DIGGS BUD JAMES

T. W. Martin has been named vice president in charge of finance.

To fill the vacancies created by these promotions, Garland Diggs has been appointed southern division manager in Corpus Christi, Tex. Bud James, district manager in Beaumont, is now assistant southern division manager.

Longino joined Weatherford in 1954 as a sales and service engineer. Since 1955 he has been southern division manager with headquarters in Corpus Christi. Louderback joined the company in 1956 as assistant advertising public relations manager and in April 1957 was promoted to advertising and public relations manager. Martin has been with Weatherford 6 years. Isham joined the firm in 1956 and Turnbull in 1957. Diggs had extensive oil-field experience prior to joining Weatherford in 1955 as a sales and service engineer and more recently was assistant to the southern division manager. James joined Weatherford in 1956 as a sales and service engineer.

Continental-Emsco Co. Makes Two Promotions . .

at its plant in Houston. Jack Amerman has been named chief engineer and Jack Eldridge chief engineer mechanical. Virgil Clark is presently chief engineer of structural. Amerman joined

JACK AMERMAN

J. ELDRIDGE VIRGIL CLARK

the firm in 1941 and Eldridge in 1951. Clark, who joined the organization in 1947, has been in his present position since 1953.

Carey Machine Co. Rigs Being Sent to Colombia . .

by General Geophysical Co., Houston. Shown discussing the shipment are Paul Carey, Carey Machine; Howard Gilbert, chief observer, Milton Grey, purchasing agent, T. O. Hall, president, and C. Sappington, chairman of the board, all of General Geophysical; and Comer Carey, Carey Machine.

These four rigs will be used in connection with helicopter work by a crew living in a tent camp. The rigs will operate in either wet or dry season. They are handled manually and are especially designed for jungle areas. In dry season an auger is used, and in wet season drill pipe.

Cooper-Bessemer Promotes Johnson, Havekotte . .

to the respective positions of assistant New York district manager and New York branch manager, according to George W. Edick, sales manager, domestic division.

Roy W. P. Johnson will assist C. M. Reagle, New York district manager, in developing broader sales markets in the New York territory. Curt J. Havekotte will supervise the domestic New York office staff and sales force

R. W. P. JOHNSON

C. J. HAVEKOTTE

in the direct sales contact of process engineering companies and users of compressors and power engine equipment.

Johnson has been with Cooper-Bessemer Corp. since 1950 and has been in the New York territory since 1951. Havekotte has been with the firm in assignments at the main office and in the New York territory. His background includes considerable experience in the application of engines and compressor equipment in the oil, chemical and petrochemical industries.

Aero Design Holds Distributors Meeting . .

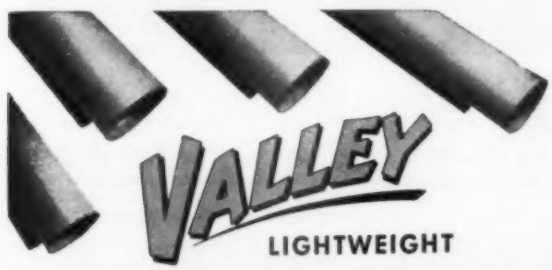
in Oklahoma City. Shown examining advance orders for the new executive airplane, the Alti-Cruiser, are Ray Wilson, general manager, Downtown Airpark, Inc., Oklahoma City; Bill McDavid, president, Aero Commander Sales, Houston; R. J. White, vice president and director of sales, Aero Design & Engineering Co., Bethany, Okla.; John S. Brown, president of Brown Aero, Dallas; and Bill White, vice president, Brown Aero.

Oil Well Supply Appoints White, Moves Ford . .

to new posts in the division. Joe White has been made assistant district engineer, machinery and equipment sales and service, at Odessa, Tex., according to William Miskimins, manager of the Central Midwest area.

B. J. Ford, Oil Well Supply Division field representative, has been transferred from Casper, Wyo., to Farmington, N. M., according to R. L. Armstrong, Rocky Mountain area manager.

White joined Oilwell at Odessa in 1945 as a field engineer. Ford was employed by the division at Casper in June 1957.



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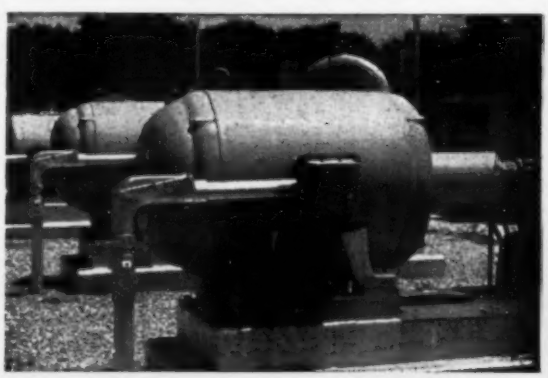

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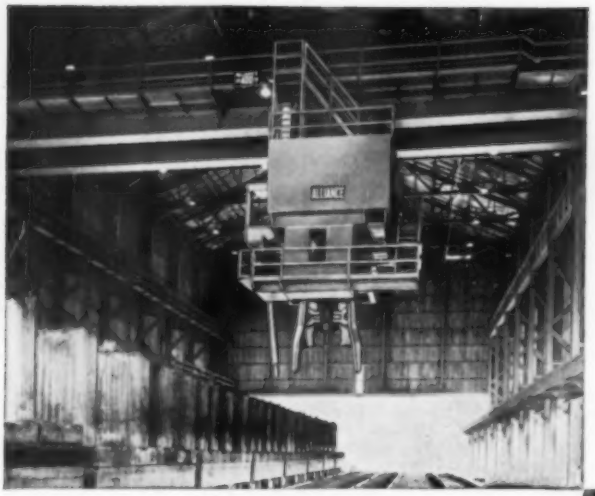

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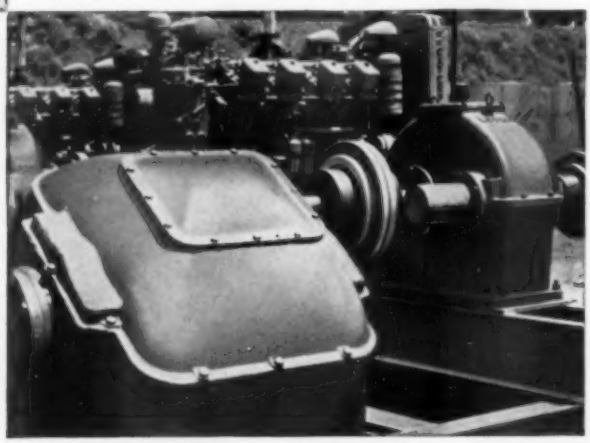

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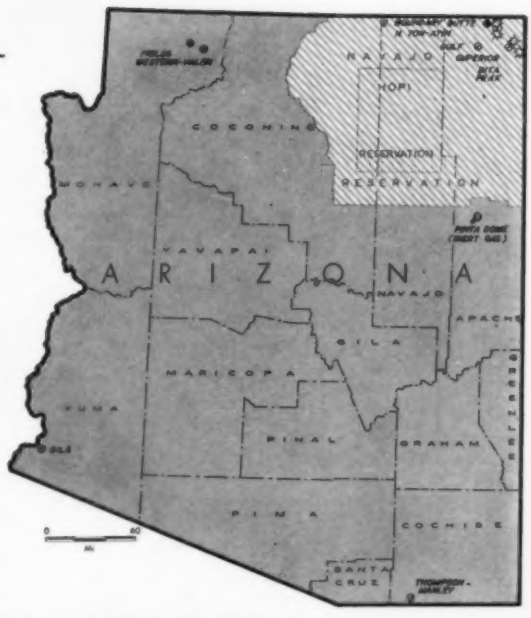
EXPLORATION

Here's the state to watch in 1958

By Frank J. Gardner
Exploration Editor



EVERY CORNER OF ARIZONA is being drilled today, as the state enters what may be the most active drilling year in its history.

PUT ARIZONA on your exploration calendar for 1958. It looks as though a record drilling year is coming up for the state. And it's about time.

The most active drilling year in Arizona history was 1957. How many wildcats were drilled? Eight. Many less-promising states did better than that. But now things are looking up; six wildcats are on the way down, one is being abandoned, and more are over the horizon. A wave of leasing has swept over the most favorable sedimentary areas, the Navajos and Hopis have settled their differences, and geologists are more optimistic than in earlier years.

Look in every corner . . . The six active wildcats, significantly, lie in extreme corners of the state—two in the northwest, two in the northeast, and one each in the southwest and southeast (see map). This testifies to the widespread interest and divergent opinion concerning Arizona's possibilities. Taken one by one, each active area has its rig magnets for the independent operator . . . and four of the six wildcats are independent operations.

Northeast . . . In the northeastern corner in Apache County lie all of Arizona's oil and gas discoveries to date. East Boundary Butte field, discovered in late 1954, has gas-condensate production from Hermosa-Pennsylvanian rocks and oil in the Mississippian. Two newer strikes, both 1956 scores, are North Toh-Atin, a Paradox-Pennsylvanian g a s-condensate discovery, and Bita Peak, with gas and condensate in both Hermosa and Paradox. This area lies within the southern limits of the Paradox basin on Navajo Indian lands, and Four Corners oil men anticipate many more fields for it.

At the moment, Superior Oil Co. has two wildcats on the drilling reports; one, the 1 Navajo "H" (Section 10-41n-30e) is dry and abandoned below 6,000 ft. The other, 2 Navajo "H" (Section 16-41n-30e) is a tight hole (as was the 1 "H') and no depths have been released. It was in this vicinity that Superior and Pan American Petroleum Corp. placed the highest bid of $213.56 per acre at a mid-January Navajo land sale. And it is here that Gulf Oil Corp. is sinking its 1 Walker Creek-Navajo in Section 28-41n-26e; this wildcat is nearing the 4,000-ft. mark now, and if it hits Paradox pay, production will be thrust 13 miles farther westward into the state.

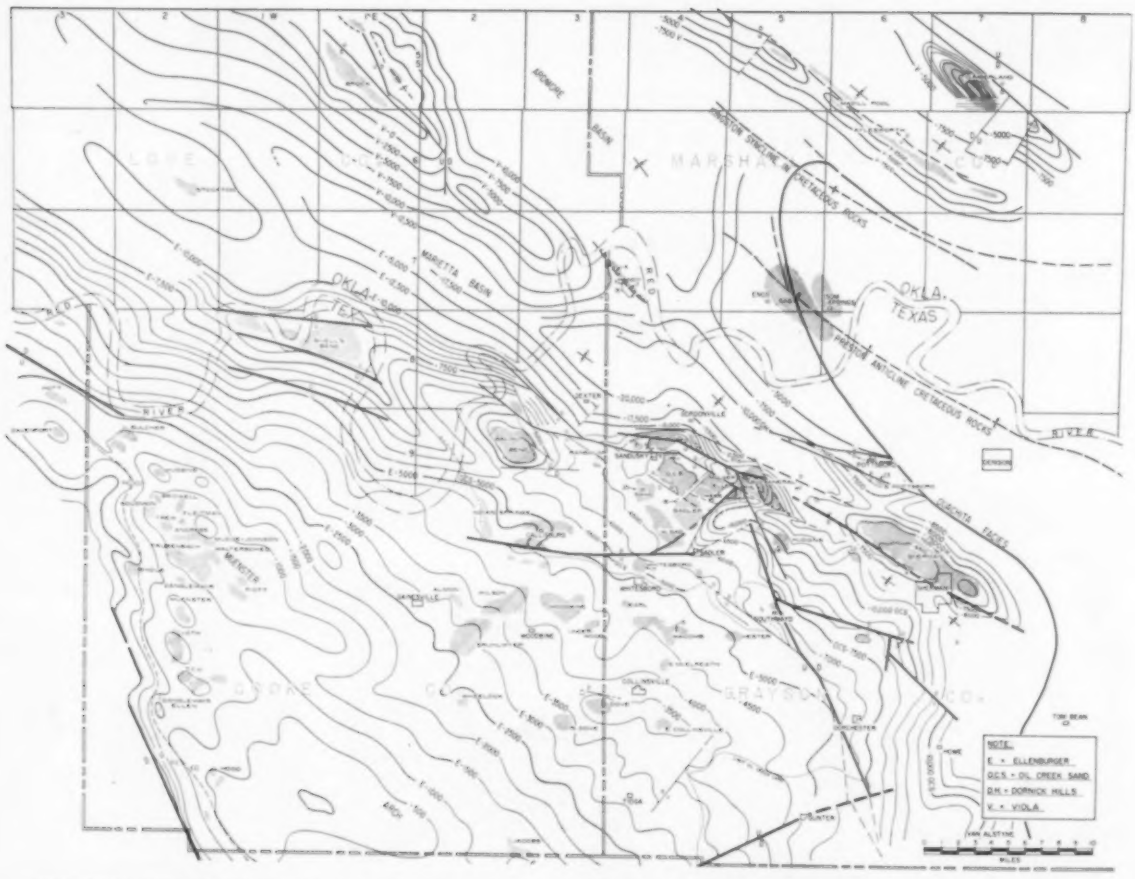
Northwest . . . In northwestern Arizona, Mohave County has two wildcats on the active litst. One is being drilled by Western Drilling Co. and Valen Oil & Minerals Corp. at the 1 Government, Section 31-38n-5w. Valen has been active in this region for several years, trying to bring the Antelope anticline and other attractive surface structures into production. In 1956, Valen sparked a four-company wildcat to the Mississippian in Section 28-40n-8w; it was abandoned at 3,753 ft. but reported oil shows in the Mississippian section at 3,733-39 ft.

West of the Western-Valen wildcat, R. A. Fields is drilling his 1-X Government, Section 17-38n-7w. This one will go to 1,500 ft. for a look at Permian and Pennsylvanian chances on the South Antelope anticline.

Southwest . . . In the far southwest corner of Arizona, in Yuma County, Gila Valley Oil & Gas Co. is testing a remote wildcat, the 1 Corinth, in Section 15-8s-22w. This one went to total depth 2,006 ft. and has plugged back to 1,260 ft. for tests of an unknown interval. Previous drilling in Yuma County has produced small showings of oil, but it is an area of stratigraphic question marks. One well, in 1955, went to 6,016 ft. as a result of a magnetometer survey, but no shows were reported.

And southeast . . . In southeastern Arizona, Cochise County has a wildcat going at L. A. Thompson and Robert Manley 1 State, Section 2-24s-31e. This is in an area of fresh interest reflected in an active lease play throughout southeastern Arizona and southwestern New Mexico (Hidalgo County). The 1 State will look for the Ordovician to a depth of 5,500 ft. It lies on a 27,000-acre block assembled by Sterling Oil Co. after geological and magnetometer survey. Other wildcats are in the rumor stage for Hidalgo County across the line in New Mexico, where good showings of Mississippian oil and gas were found in a 1957 wildcat failure. Several major companies are interested in this virgin hunting ground.

So put Arizona on your calendar for 1958. You might see 25 new wildcats going down. And you may see some christmas trees going up.



REGIONAL AND LOCAL structural trends are apparent on subsurface map of Cooke and Grayson counties. Fig. 1.

Complex geologic structures in Texas indicate . . .

Careful Groundwork Pays Off

By M. C. Kelsey
Pres., Rayflex Exploration Co., Dallas

COOKE AND GRAYSON counties, Texas, provide an attractive exploration province for those operators who will devote the study and analysis necessary to unravel the complexities that mask the oil-bearing traps. This is one area where the small independent operator has attained as much success as the larger oil companies. This success depends primarily on geologic interpretation of subsurface and geophysical data to reveal the true geologic structure. (see Figs. 1 and 2).

In Cooke and Grayson counties, as elsewhere, a consistently successful exploration program has the following divisions:

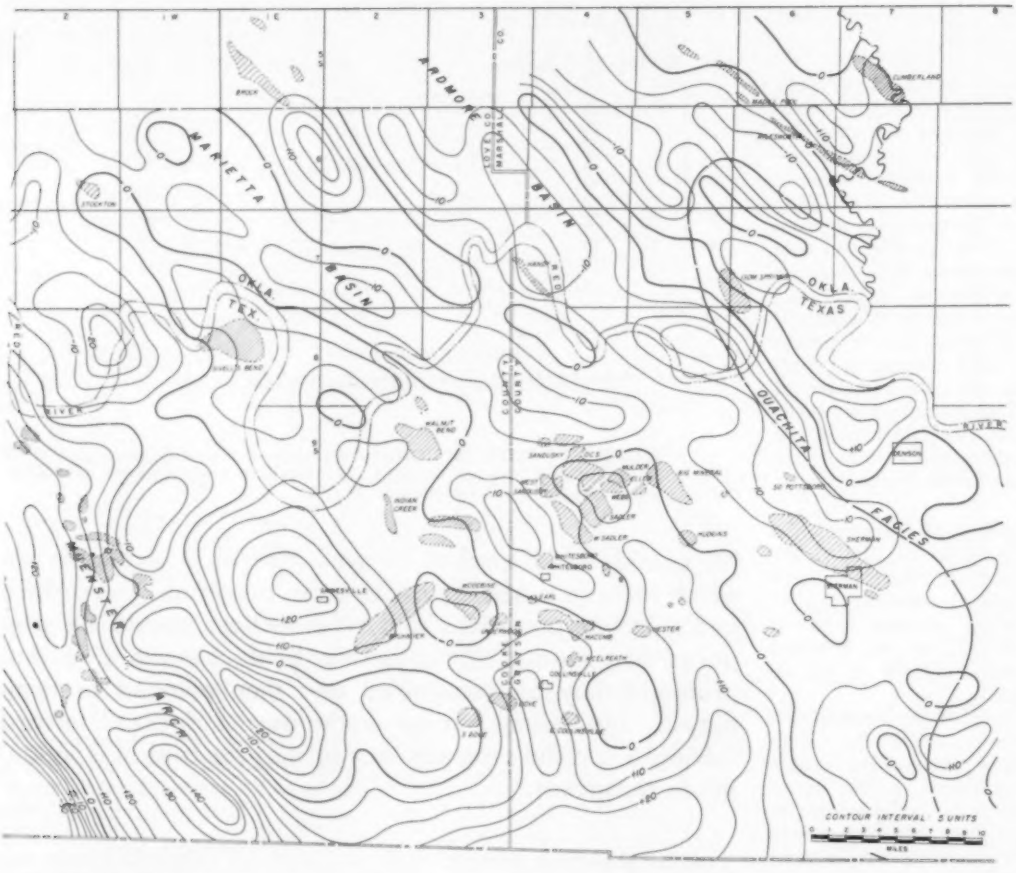
1. Initial planning and defining of objective.
2. Preliminary investigation to determine the probability of success.
3. Decision as to methods of further investigation.
4. Careful preparation to put into operation the methods chosen.
5. Detailed investigation.
6. Interpretation of data.
7. Analysis and evaluation.
8. Decision leading to a successful drilling program.

Should a seismic survey be decided upon as one of the methods for a detailed investigation, full attention to Step 4 in the foregoing outline is one —if not the most—important phase of the seismic program.

Many of the general problems of seismic operation and interpretation in Cooke and Grayson counties have been successfully solved. The following discussion may serve to guide and, in some measure, help provide the newcomer to the area with a better understanding of the requirements involved for a successful seismic survey in these two Texas counties.

In considering the use of the reflection seismograph in the subject area, these questions arise:

- Can reliable data be obtained? If so, from where in the geologic section do reflections originate?
- Is velocity control available?
- Which seismic survey technique (jump correlation, isolated-dip determinations, or continuous profiling) is required to resolve the structural configuration in a local area?
- Which interpretation technique may be used?



DERIVATIVE GRAVITY map can sometimes be a necessity in early phases of seismic exploration. Fig. 2.

In Cooke and Grayson Counties

- What are the physical aspects of the area?
- What are the operational procedures for the field units of the survey party?
- What is required in crew equipment and personnel to conduct an efficient survey?
- What is the estimated monthly cost of operation for a seismic party?

Seismic records . . . Strong persistent reflected events are obtained from the top of the Lower Pennsylvanian gray section and a number of markers in the pre-Pennsylvanian section. Several weaker and less persistent reflections are obtained in the middle and upper portions of the Pennsylvanian section.

In a given area, if the interest is primarily in the structural configuration of these shallower events, additional seismometers (at least 10 and perhaps as many as 20 per group) may serve to improve the signal-to-noise ratio on the weak reflections. In general, the velocity control available in Cooke and Grayson counties is well distributed and suitable for detailed structural studies.

Seismic survey technique . . . The jump-correlation technique is a low-cost method of exploration in areas where "character" correlations are reliable. Uniform character is usually closely related to relatively uniform intervals between reflected events. In the Cooke and Grayson counties area, however, the structural features are often complicated by faulting. Furthermore, in many cases pre-Pennsylvanian beds present on the downthrown side of faults are absent on the upthrown block (see Figure 3).

Jump-correlation L spread groups, consisting of three shot points arranged to give two components of dip separated 90° in the horizontal plane, would offer some of the economical advantages of the single-shot-point jump-correlation spreads and would allow the computation of dip-strike in addition to the correlated depths. In the final analysis, however, each of these methods is dependent upon character correlations from point to point.

An exploration program consisting of well-planned straight crosscountry dip lines, tied together at the desired points, with closed traverses of control offers the most suitable exploration method in Cooke and Grayson counties. Often jump-correlation points are helpful within the large

closed loops of continuous correlation control.

Interpretation . . . In a region of rapid facies changes, steep dips, and extensive faulting, the most important fact to remember is that reflection-seismograph records are inherently limited to the measurement of time. The validity of any seismic interpretation depends entirely upon how the observed time values are interpreted. If a formation is moderately flat or a uniformly dipping plane, it can be satisfactorily mapped by simply writing or plotting the reflection time or computed depth directly under the shot point on the map or the cross-section. However, such conditions are rather limited in Grayson County where extreme variations and anomalous conditions prevail.

The complexity of the situation is graphically depicted by Fig. 1. Extreme conditions are further illustrated by the geologic cross-section (Fig. 3). The Ellenburger plunges from an eroded −1,000 ft. at the Muenster arch to below −11,000 ft. in the Marietta basin.

Because of the highly complex and fault-complicated subsurface conditions of the region, seismic control lines must be placed so that the recorded times may be computed to provide two or three-dimensional control rather than the simple depth control satisfactory for many areas. There are several satisfactory approaches to a solution.

Two-dimensional control is often entirely adequate if straight strike and dip lines are shot without appreciable deviation of direction. The data thus obtained may be plotted on the cross-sections with a plotting arm or a wavefront chart. The migrated data will then appear in very nearly their correct positions on the dip lines, but must be further migrated from the section to the map on the strike lines if the dip is appreciable.

If control lines cannot be kept straight, or if dip and strike configuration are erratic and of considerable magnitude, the two-dimensional solution must either be supplemented by third-dimension computations or abandoned in favor of a direct three-dimension computation system. This is most commonly used with cross-component spreads placed every ½ to ¾ mile and computed as resultant dips. A primary consideration is still the placement of control lines to cross-faults at nearly right angles and in the full dip direction.

Subsurface control . . . A considerable amount of well control is available on which to base a seismic exploration program. Subsurface geologic interpretations and crosssections should be prepared in advance of the seismic field operations so that problems may be recognized and then avoided or minimized.

The seismic survey works best if directed toward solving a specific problem that subsurface control is inadequate to answer than as a panacea for uniliteral finding of an oil field. The geophysicist should be furnished the geologic investigations and briefed on the area if he is to provide the most intelligent interpretation of the seismic data.

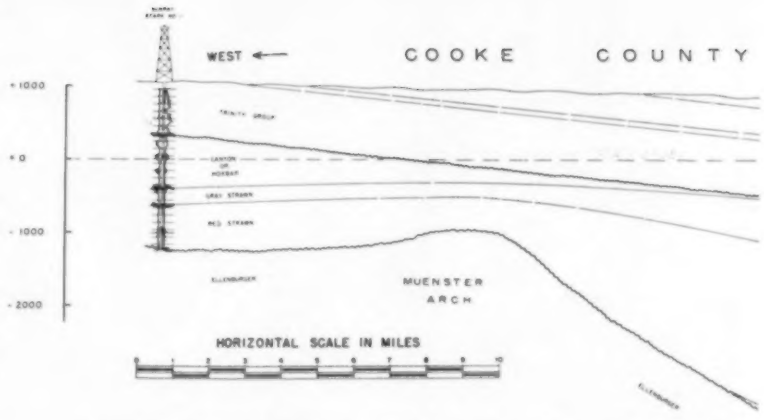
Integrated maps . . . The most satisfactory end product of a good seismic survey is an integrated contour map on which all of the seismic depth values have been adjusted to fit the well data of the subsurface interpretation. When necessary, local and regional velocity variation must be accounted for in making these adjustments.

Such maps represent a realistic approach from the standpoint of the geologist and tend to maintain a close check on seismic and geologic data at all times as the work progresses. Spurious dips and discrepancies in amount of fault throw are more readily spotted and corrected. A carefully prepared and integrated seismic map allows a quick appraisal of a given anomaly and its relationship to outlying geological control.

Physical aspects . . . In general, the surface of the area is covered by Lower Cretaceous rocks unrelated to the underlying Paleozoic structure. These surface formations consist of limestones, sandstones, marls, and clay. The Red River forms the northern boundary and the drainage system of its tributaries has formed relatively deep valleys in this portion of the area.

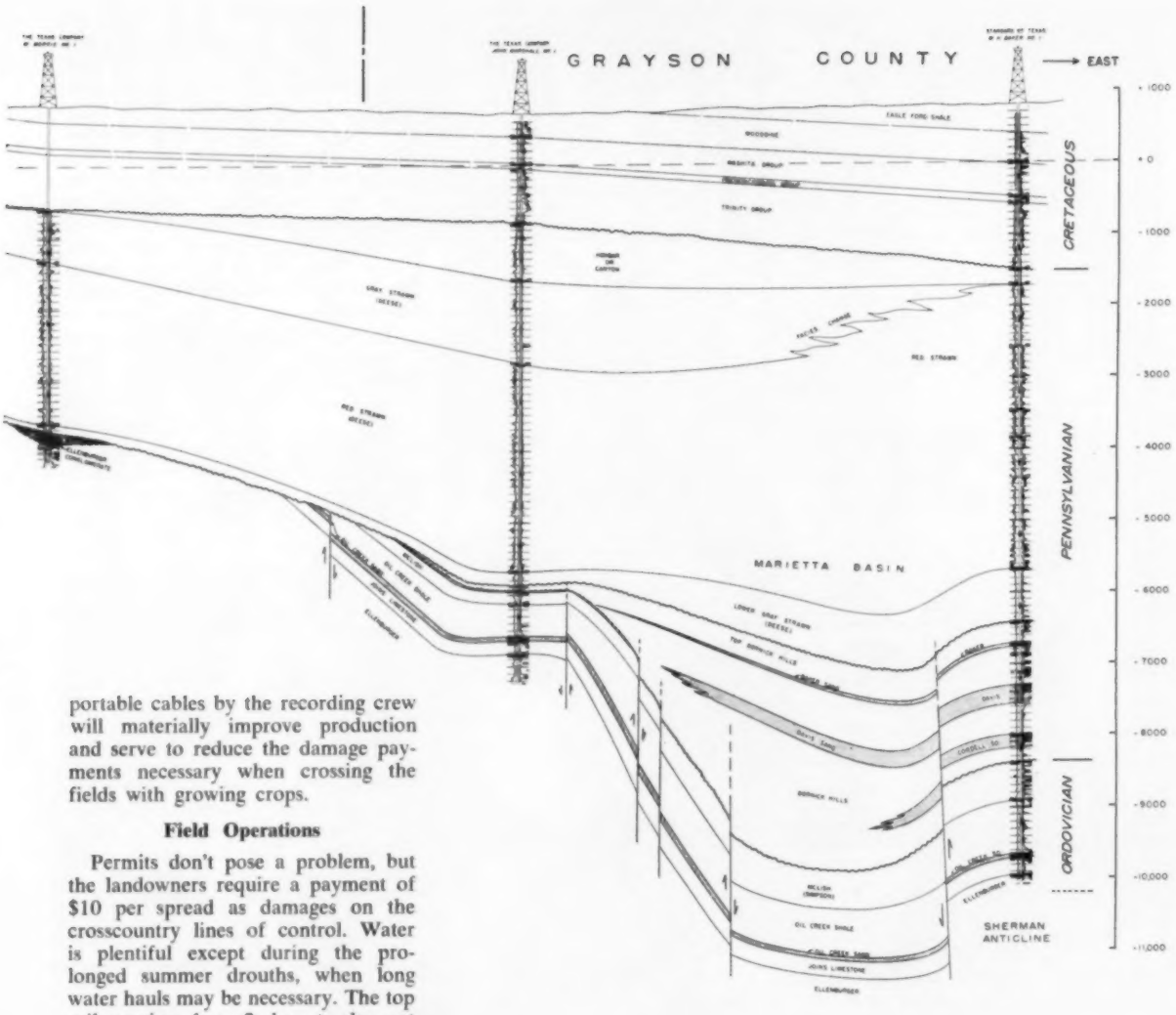
These surface formations form gentle, rolling topography over most of the region with open pasturelands and wooded areas. In portions of the area, the position of the numerous drainage channels and the associated wooded strips may, in some measure, affect the placement of control points and lines. Work in the wooded areas may require the services of brush cutters or, if permitted by the landowner, a bulldozer.

Much of the region is open pastureland and cultivated fields. Fences separate the various landownerships and the small tract of pasture and cultivated land under single ownership. In obtaining straight cross-country lines of control, the use of



A GEOLOGIC CROSS-SECTION reveals some of the structural complexities of Cooke and Grayson counties. The Marietta basin extends northwestward into southern Oklahoma. Fig. 3.

"A considerable amount of well control is available on which to base a seismic exploration program. Subsurface geologic interpretations and cross-sections should be prepared in advance of the seismic field operations so that problems may be recognized and then avoided or minimized. The seismic survey works best if directed toward solving a specific program that subsurface control is inadequate to answer."



portable cables by the recording crew will materially improve production and serve to reduce the damage payments necessary when crossing the fields with growing crops.

Field Operations

Permits don't pose a problem, but the landowners require a payment of $10 per spread as damages on the crosscountry lines of control. Water is plentiful except during the prolonged summer drouths, when long water hauls may be necessary. The top soil requires 1 or 2 days to dry out after a heavy rain, and field production may be slowed by soft field conditions during the wet winter and spring seasons.

Surveying presents no special problems and can be handled in the conventional manner, by chaining distances between shot points and instrument group stations and using a plane table and alidade for mapping and elevation purposes. The surveying can be greatly facilitated if the surveyor has topographic maps obtainable through the United States Geological Survey, and country road maps available from the Texas Highway Department.

Most of the area can be drilled quite easily with drag bits, but rock-cutter bits (inserted with hard metal) are required in some localities. Clay and shale are very common formations, but limestone, sandstone, and caliche may also be found in some areas. Normally, hole depths of 60 to 80 ft. in depth are well below the weathering and allow the selection of optimum shooting depths in favorable clays or shales. Economical production can usually be obtained by the use of one rotary drill and one water truck.

Excellent records have been obtained in this region from continuous-correlation split spreads, with shot holes spaced from 1,000 to 1,320 ft. apart, and with four seismometers per group on a straight circuit. Filter settings and charge size must be varied to fit local conditions, but the optimum filter-band pass range is approximately 30 to 50 cycles per second. Charges of 10 lb. or less will usually provide adequate energy propagation. The shot holes normally stay open quite well and thus allow shots at several different depths in order to "play" the hole for the optimum natural ground filtering. This has been found to be of critical importance in some areas.

The estimated cost of operations of a seismic party in Cooke and Grayson counties is between $14,500 and $15,000 per month. This includes all sundry client charge items plus damage claims.

Acknowledgments

Successful seismic work has been a key factor in oil-finding efforts within the complex area of Cooke and Grayson counties, Texas. The Dallas Geophysical Society and the Dallas Geological Society have published a volume entitled "The Geology and Geophysics of Cooke and Grayson Counties, Texas." This abridged article and the accompanying figures are taken from the 192-page volume and illustrate how geophysics and geology can be tied together successfully in planning an effective exploration program.

The writer is indebted to H. C. McCarver and Seaboard Oil Co. for assistance in obtaining velocity control; to H. H. Bradfield for the use of his subsurface map of Cooke and Grayson counties, and for his correlations of well logs; and to F. J. Williams and H. C. Towles, Jr., for their assistance in the preparation of this paper.

Anderson Leads East Texas

BY CARL HOOT
District Editor

IF A PALL of gloom hung over the drilling industry last year, East Texas operators apparently hadn't heard of it. Total completions in Texas Railroad Commission Districts 5 and 6 amounted to 1,359 in 1957, or an increase of 226 wells over 1956.

No one factor is credited for the increase in drilling. Woodbine discoveries in Anderson and Cherokee counties, plus the development drilling around these pool openers, boosted total wells.

Salt-dome exploration did not add materially to the drilling picture, but the importance of future salt-dome prospects increased, and a number of deep tests around known structures were drilled. At least one important new pay section was added, at Bethel dome in Anderson County.

Over-all success ratio of oil, condensate or gas wells to dry holes was slightly over 56 per cent. Total wells successfully completed was 765, leaving 548 finished dry.

Wildcat completions totaled 387, of which 19 were completed as commercial wells.

Development drilling, or field wells, accounted for 972 wells, of which 748 were completed as oil wells and 44 as gassers. Success ratio of this classification was 81.5 per cent.

The heaviest exploration drilling was in Anderson and Cherokee counties, which together received about one-third of all East Texas wildcatting. Anderson County total was 79, of which 5 were completed as oil wells. Cherokee County total was 55, resulting in 1 gas and 2 oil discoveries.

Four counties lead in development drilling. These counties and the total field wells drilled in each were: Anderson, 210; Harrison, 198; Panola, 116, and Rusk, 98. Combined total was 622 wells.

Footage drilled, for all wells, was 6,684,988 ft., giving an average well depth of 4,919 ft.

Wildcat footage was 1,988,658 ft., leaving 4,696,330 ft. for field wells.

Anderson County most active . . . Heaviest drilling in Anderson County was for Woodbine and sub-Clarksville pays, and was centered around Slocum townsite. Ten fields in that area, all within a 5-mile radius of Slocum, have developed into one of the largest producing areas in East Texas since discovery of Neches field in 1953. Most of this drilling was by independents.

Operators have said that faulting makes almost every well in the Slocum area a wildcat, and it is this condition that accounts for the many feld classifications in a relatively small area. These fields, many of which border each other, are Agnes, Day's Chapel, David-Gail and Salmon. Also included are the Slocum fields which are named East, South, North, West, Northwest and Southwest Slocum.

Development drilling in all these fields accounted for approximately 100 wells, of which 79 were commercially completed. Main production is the Woodbine, except in David-Gail and North Slocum, which are sub-Clarksville.

New fields and new pays . . . Hickory Grove, Salmon, Southwest Slocum and Agnes were new-field names given discoveries in Anderson County. New pays included "weaver" and "C" sands in Northwest Slocum, and the "A" sand in West Slocum. All of these zones were in the Woodbine.

Salt dome new pay . . . The Texas Co.'s Rodessa gas-condensate discovery on the southwest flank of Bethel (Woodbine) field was ranked as one of the year's most important finds. The well made an open flow of 20,500 M.c.f. of gas a day, plus 21 bbl. of condensate per 1,000 M.c.f. At year's end, Texaco had another test going in the same area.

Bowie County . . . Sunray Mid-Continent Oil Co.'s 1 Burgess, 2 miles southeast of Maud, attracted considerable attention even though it was completed dry. This was a Smackover test, geologically located along the Mexia-Talco fault system. According to reports, tests in the Smackover around 9,100 ft. recovered as much as 140 ft. of 42°-gravity oil.

EXPLORATION THIS WEEK

East Texas	146
Appalachian	149
Montana	150
California	152
Alberta	154
Nebraska	157
Oklahoma	157
Rocky Mountains	163
Michigan	163
North Dakota	163
Louisiana	163

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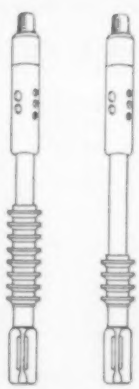

Simplex cups are equally suitable for lifting ordinary light loads with minimum suction across the sand face. Number of cups may be varied to fit specific well conditions.

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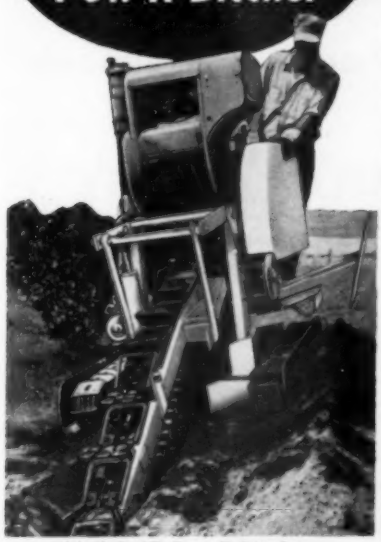

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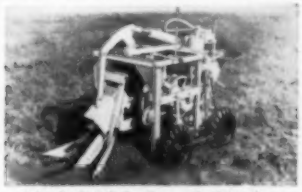

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New Book Gives North Texas Field Data

Rinehart Oil News Co., Dallas, announces distribution of two new reference books on North Texas oil fields.

A 269-page volume covers development history of 335 fields in Montague, Wichita and Wilbarger counties, and a 268-page volume takes in 375 fields in Wise and Young counties.

Data in each volume includes field maps, a map showing geologic provinces in North Texas, geological cross-sections, a generalized geological chart of pay formations, electrical logs, completion histories and production statistics on 1,592 individual oil and gas fields located in Texas Railroad Commission District 9.

The two new books are the fourth and fifth in a series of five North Texas area reference books published during 1957.

APPALACHIAN

EASTERN KENTUCKY

Rank Wildcat Drilling In Carter County

In Carter County, located approximately 5 miles northwest of Grayson, the county seat, Ralph Thomas et al is drilling at 640 ft. on 1 Jim Simmons, a rank wildcat for this area in eastern Kentucky. Test is planned to evaluate the St. Peter sandstone and upper portion of the Knox dolomite, both formations being of Cambro-Ordovician age. Cable tools are being employed.

OHIO

New Gas Pool Indicated North of Coshocton

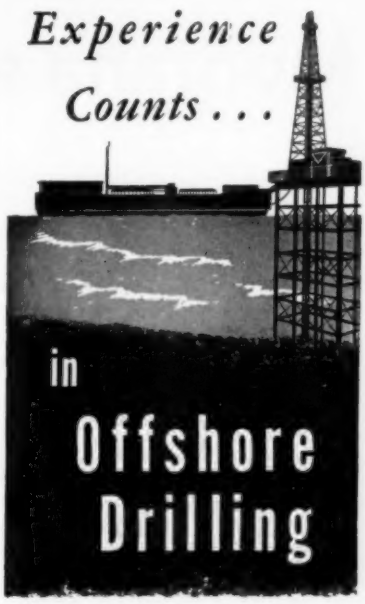
A new gas pool north of Coshocton is indicated by the results of Roberson-Williams' test on 1 B. E. Dreher, Lot 4, Tuscarawas Township, Coshocton County.

Gas flowed at the daily rate of 450 M.c.f. after fracture from the Clinton sand at 3,685-3,732 ft. Rock pressure was 1,050 psi.

Newburg Makes Best Show Yet at Moreland Pool

The best showing in the Newburg sand yet found in Moreland pool was on the 1 J. Rayl, Section 3, Franklin Township, Wayne County. Franklin Oil Co. completed the well with an open flow of 2,320 M.c.f. per day, natural, from 3,005-41 ft.

Experience Counts . . .



and so does . . .

EQUIPMENT

Reading and Bates operates two Levingston offshore drilling tenders with National Supply Co. Type 130 rigs, capable of drilling to a depth in excess of *20,000* feet in water *100* feet deep.

DEPENDABILITY

Reading and Bates is a dependable contractor with seasoned, experienced men operating their rigs. Contracts are fulfilled to the last letter.

KNOWLEDGE

Reading and Bates are specialists in offshore drilling. Their basic knowledge of offshore drilling problems, plus their wide experience, assures you of a job well done.

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Montana's Outlook expands

with hits at Thorson and Wexels

THE WEST SIDE of Sheridan County's Outlook area in northeastern Montana added two new wells last week. Amerada Petroleum Corp. completed its 1 Thorson in C SW SE 21-36n-52e, and the 1 Wexels in NE NE 23-36n-52e.

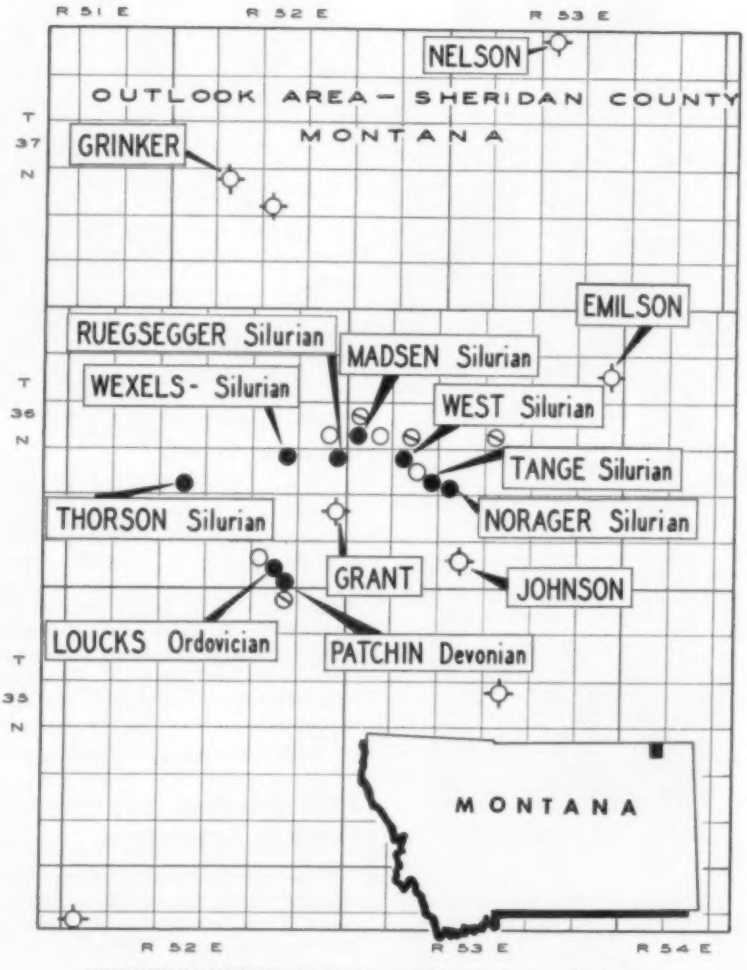
● **Thorson . . .** The Thorson well was finaled flowing 76 bbl. of oil per day from the Outlook pay (Silurian) perforations at 8,875-90 ft. Location is 2 miles west of nearest Outlook field production.

● **Wexels . . .** The Wexels well was finished pumping 31 bbl. of oil per day from open hole at 9,092-9,100 ft. in the Outlook pay. Wexels is 2 miles east of the 1 Thorson and 1 mile west of nearest Outlook field production.

Outlook . . . Outlook field was opened early in 1957 at Amerada's 1 Tange —a prolific Silurian discovery that flowed 2,742 bbl. of oil per day on ½-in. choke. This well was considered the exploratory highlight of the year for Montana—and the Williston basin as a whole. The Tange discovery set off a new concept of Williston basin thinking with exploration being directed to the pre-Mississippian rocks.

Tange was followed by the Ruegsegger discovery which made 293 bbl. of oil per day on 11/64-in. choke from the Silurian; the 1 Loucks, a 312-bbl. per day well from the Ordovician (a new pay for the field area); the 1 Patchin, a Devonian well (another new pay for the field); successful Silurian offsets at Norager, West, and Madsen. The field now has an apparent productive area of 15 sq. miles.

There were several important dry holes drilled last year in the Outlook area. Carter Oil Co.'s 1 Nelson near the Canadian border, about 10 miles northeast of the field, was watched closely during its drilling. Amerada drilled a northwestern wildcat at 1 Grinker, an in-between well at 1 Grant, and a southeastern-limit well at 1 Johnson.



WILLISTON'S BIGGEST pre-Madison field continues to flourish.

New era unfolds . . . Outlook's pre-Mississippian success is spilling over into North Dakota. Amerada completed four deep wells at Beaver lodge last year, all with Silurian and Devonian production. The company now has a discovery southwest of Beaver Lodge and off the west flank of the Nesson anticline in the Silurian.

Three definite Williston basin exploratory trends are now in progress —Mississippian exploration in the border counties: Burke, Divide, and Renville counties in North Dakota; pre-Mississippian exploration in northeastern Montana, Divide County, North Dakota, Beaver Lodge field itself, and off the Nesson anticline; and, across the border in Saskatchewan, oil hunters are looking with interest at the possibilities of the pre-Mississippian rocks. A recent showing of Ordovician oil at the Hummingbird area wildcat, northeast of Outlook in Canada, indicates what lies ahead in Saskatchewan.

This announcement is neither an offer to sell nor a solicitation of an offer to buy any of these Shares. The offer is made only by the Prospectus.

7,602,285 Shares

Nominal (par) value 20 guilders a Share

Royal Dutch Petroleum Company

(N.V. Koninklijke Nederlandsche Petroleum Maatschappij)

(A Netherlands Company)

Rights to subscribe for these shares are being issued by the Company to its shareholders, which rights will expire at the close of business on February 10, 1958.

Subscription Price $30 or 114 guilders a Share

(at the option of the Subscriber)

The several underwriters may offer shares at prices not less than the Subscription Price set forth above (less, in the case of sales to dealers, the concession allowed to dealers) and not more than either the last sale or current offering price on the New York Stock Exchange, whichever is greater, plus an amount equal to the applicable New York Stock Exchange commission.

Copies of the Prospectus may be obtained from only such of the undersigned as may legally offer these Shares in compliance with the securities laws of the respective States.

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January 20, 1958.

HARRISBURG FLANGES

Harrisburg Drop-Forged Steel Pipe Flanges are made to A.S.A. standards for oil companies, ship builders and pipe fabricators. They come in threaded, butt-welding, slip-on welding, Van Stone and blind types and are shot-blasted and dip-coat finished with a rust preventative black lacquer. Be sure you make it Harrisburg when you want flanges.

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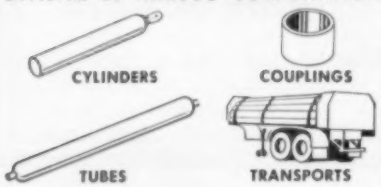

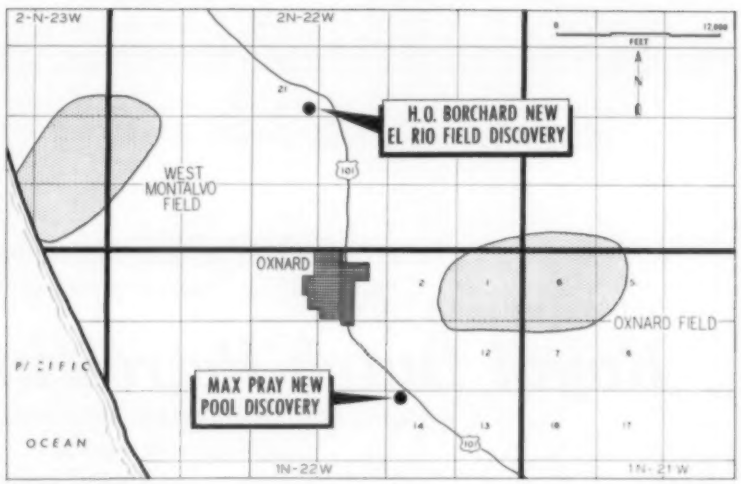

CALIFORNIA has two new strikes in 1 month, and is expected to stir drilling on the Oxnard plains.

Sespe scores twice

VENTURA COUNTY'S Oxnard plains provided California with its first new field discovery of 1958.

The find was scored by Standard Oil Co. of California, Western Operations, Inc., with a wildcat in SE SE 21-2n-22w. The discovery well, 1 H. O. Borchard, was completed in an Oligocene Sespe sand at 10,810-11,267 ft. Total depth of the test was 11,620 ft.

During the first 24 hours it flowed 759 bbl. of 31.6°-gravity crude, 0.8 per cent cut, through an 18/64-in. choke. Standard-Western later closed it down to 13/64-in. and it flowed at the rate of 531 bbl. daily.

The new discovery, with Standard-Western acting as operator for itself and Western Gulf Oil Co., is located about 2½ miles northwest of the Oxnard field and 2½ miles northeast of the West Montalvo field. It is just off coast highway U. S. 101 near the small community of El Rio. The field has been named El Rio field.

This was Standard-Western's second major effort in Section 21. The first was drilled and abandoned at 15,022 ft. last year just 2,000 ft. north of the new discovery. It failed to turn up any commercial shows.

It is expected the new find will spur drilling activity in the Oxnard area with Superior Oil Co., Sunray Mid-Continent Oil Co., Ohio Oil Co., and the Lloyd Corp., all holding substantial acreage nearby.

Standard-Western's successes is the second major find for the Oxnard area in the last month. The first was Max Pray's new pool discovery in NW NW 14-1n-22w at Christmas time. It was completed in a new Sespe pool making 528 bbl. daily from 7,745-67 ft. initially. It is located about 1 mile south of the nearest Oxnard field producer.

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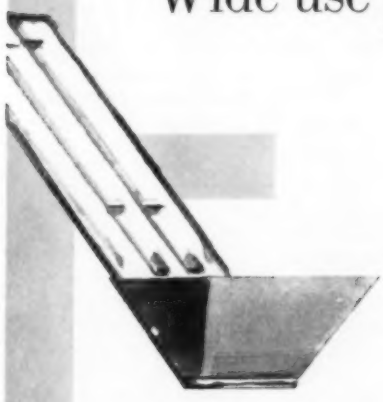

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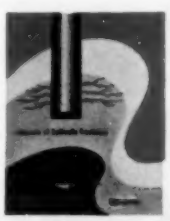
SANDOIL is EFFICIENT for a wide range of applications ... can be easily modified with Halliburton chemicals to help prevent emulsions and control fluid loss.

For further information ask for your free copy of the new revised "Elements of Hydraulic Fracturing."



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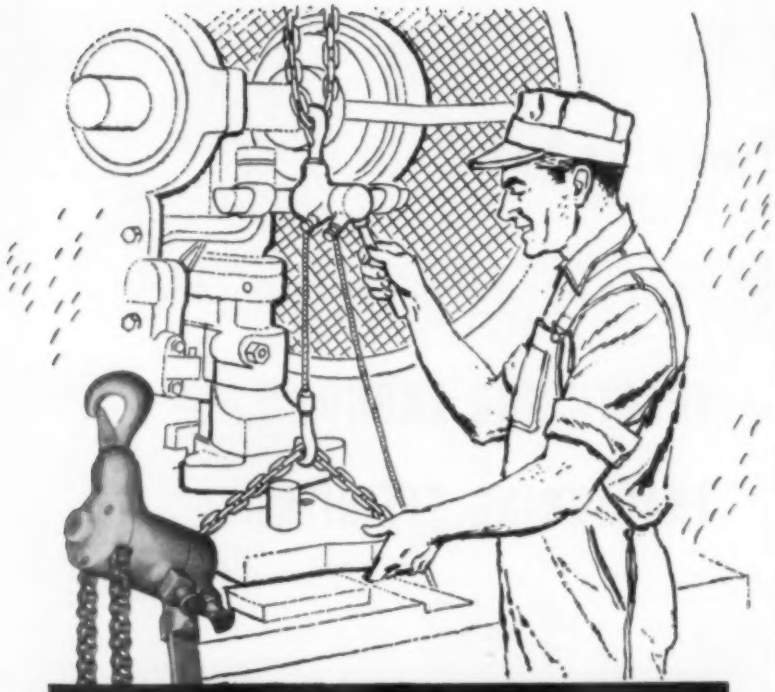

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The Coffing
Mighty Midget Puller

Compact and lightweight, the Coffing Mighty Midget Pullers are handy lifting tools for all types of industries. The 1000 lb. capacity model weighs but 9½ lbs. and requires only 40 lbs. of handle pull. The 500 lb. model weighs 6½ lbs. and requires only a 28 lb. pull for full rated capacity.

The handle can be operated as a crank for fast lifting, or it can be used as a lever for short pulls, or for working in cramped quarters. Should the puller be overloaded, the "safety valve" handle will give before any load bearing part fails.

For full information on this compact, light and inexpensive lifting tool, consult your favorite supply store, or write for Bulletin MP.

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Alberta Offer Gets Attention

THE ATHABASCA tar sands of northeastern Alberta swung back to the attention of the oil industry last week as the Alberta Government Mines and Minerals Department, governing body for mineral resources within the province, announced the offering of approximately 1.5 million acres under bituminous-sand prospecting permits.

Exact reaction of the industry to this government move will not be known until the final sale results are tallied on the afternoon of February 18, 1958, as company moves towards acquisition of Crown rights at cash bonus sales are closely guarded secrets.

However, the actual sale announcement indicates growing interest in this region which holds the largest single known reserve of crude oil in the world today, Texas included. Reserves of the region that lies about 200 miles northeast of Edmonton along both banks of the Athabasca River are estimated by authoritative sources between 100 billion and 300 billion barrels of oil.

The sale notice, offering for the first time bituminous-sands prospecting permits on a cash bonus basis, follows by just 1 year the Royalite Oil Co., Ltd., report on planned development of its reserves in the tar-sand area. Royalite's plans, which are being carried out very quietly in this remote region, have already prompted many exploration projects in the area. Total permits issued at the time of the Royalite announcement were no more than 28, and some of these had actually been dropped. Since that date 40 more permits have been taken out by large and small companies alike.

"Insurance Policies" reserving a stake in the future development of this world-renown oil region seem to have rather high rates when viewed at a glance, and in addition there is no guarantee on length of payments. However, stakes may be higher and the possibility that the key to unlock these vast petroleum reserves may be found just around the corner has led many firms into taking out the government's tar sands contracts.

Royalite and its associates believe they have the answer in the Coulson centrifuge process and are backing their theories with the expenditure of a reported $50,000,000 on a development project. This group has already

"Permits are renewable for second year"

made application to the government for a permit to build a pipeline from the area to Edmonton. Another method which is claimed by its patent holder, Sonic Oil Separators, Ltd., to be an economic way of extraction was announced in the latter months of last year and is presently being tested.

The Crown has already invested large sums of money in attempts to find an economic method of extracting the heavy oil from the sand of the region and is thus very interested in furthering all possible avenues of approach that might utilize this reserve. The requirements under which the permits are issued therefore, are designed to open exploration and development of the area.

General permit requirements include deposit of $50,000, a permit fee of $250 and rental for 1 year at the rate of 5 cents per acre. Companies must also submit plan of proposed examination and if said plan is approved by the minister the firm may be granted a permit with a maximum area not to exceed 50,000 acres.

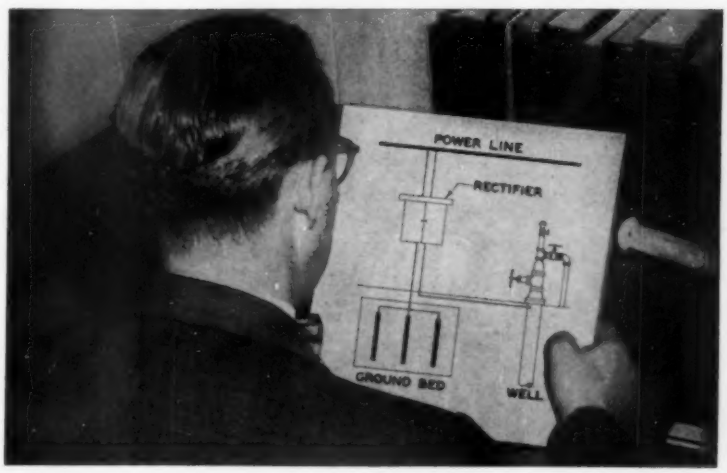
Permits are renewable for a second year at the rate of 10 cents per acre and for a third 1-year term at the same per acre rate. If a permitee carries out all requirements of the permit but does not make application for a lease the deposit will be refunded.

Leases will be granted following approved examination of the permit rights and may vary in size with the extraction operation planned by the lessee. Leasing requirements include start of construction of proposed plant within 1 year of issuing date and placing of the plant in operation within 4 years.

An area sufficient to supply material for a 30-year operation may be included in one lease tract and leases shall be for a 21-year period, renewable for a further term as long as the plant remains in operation. Rentals on leases will be at the rate of 25 cents per acre for the first 5 years and $1 per acre for the remainder of the term. Adjustments to the lease fee may be made at the discretion of the minister.

The rights offered at the forthcoming sale blanket a large portion of the tar-sands area adjoining and surrounding presently issued permits. Permits and lease rights in the area that were issued prior to Royalite's announcement last year are now held by the following firms: Amurex Oil Development, Bailey Selburn Oil & Gas, Ltd., Calvan Consolidated Oil & Gas, Ltd., Consolidated Mic Mac Oils, Ltd., Charter Oil Co., Ltd., Colorado Oil & Gas, Ltd., Great Canadian Oils Sands, Ltd., Home Oil Co., New Continental Oil Co., Pacific Petroleums, Richfield Oil Corp., Royalite and associates, Scurry-Rainbow Oils, Ltd., Shell Oil Co., Sun Oil Co., Supertest Petroleum Corp., and Trans Empire Oils.

The new permits taken out since that date include four obtained by the British American Oil Co., two by Canada Cities Service Petroleum Corp., one by Dome Exploration (Western), Ltd., one by Canadian Husky Oil, one by the French Petroleum Co. of Canada, eleven by McColl Frontenac Oil Co., one by B. Van Mart Massie, three by Mobil Oil of Canada, another seven by Richfield Oil Corp., one to Shell, a pair to Sinclair Canada Oil Co., two to Texaco Exploration Co., and a single permit to Transalta Minerals, Ltd., Union Oil Co. of California, and Western Hemisphere Petroleum Corp. Exploration activity has been increasing during the past number of months and is expected to continue its increase in the near future.



HOW A MAJOR OIL COMPANY USED RECTIFIERS TO STOP CORROSION OF WELL CASING

This major oil company has 33 of its wells in a pool in northwestern Kansas. Past experience indicated that external corrosion of casing would become a major maintenance item.

The wells were surveyed to determine the amount of induced current needed for cathodic protection. Then CSI was awarded a rectifier-installation contract on a competitive bid basis. Ground beds had to be individually designed for each well to meet the two-ohms circuit resistance specified.

CSI engineers furnished and installed 33 rectifiers, graphite anodes, coke breeze and all necessary connections. The job was finished ahead of the promised date, and to exact contract specifications. The cost was approximately $300 per well.

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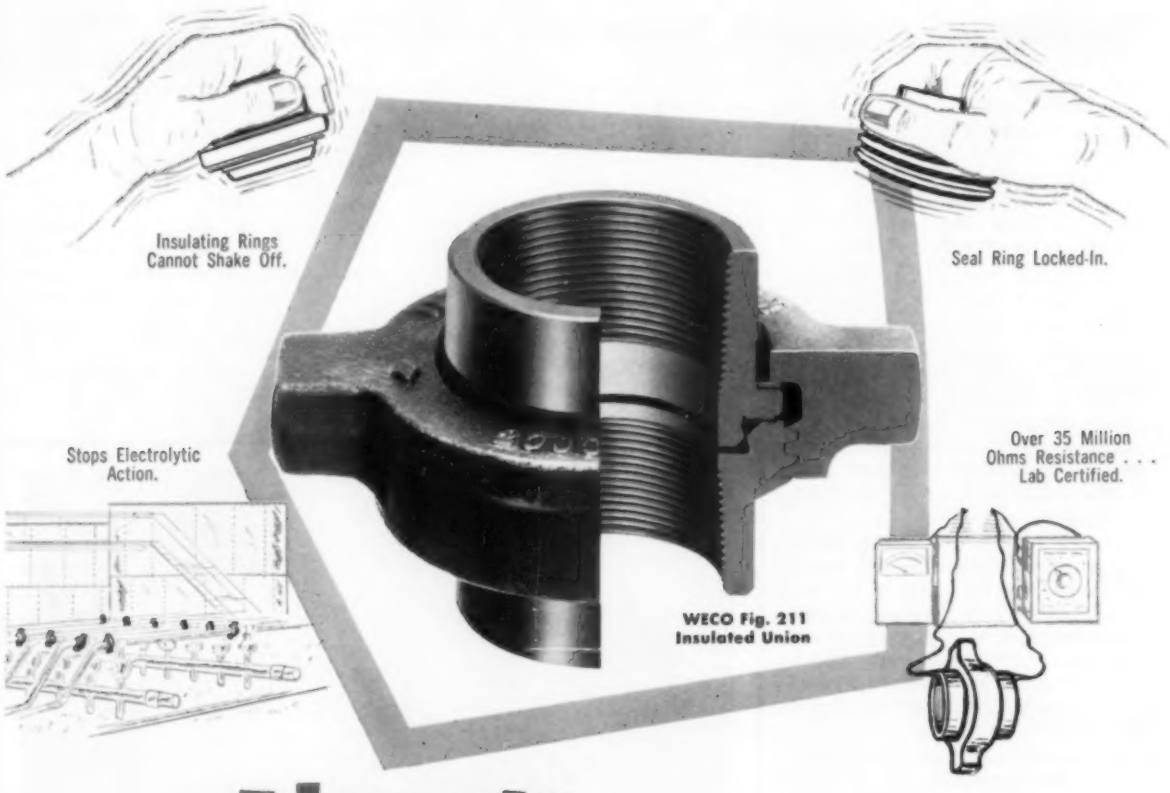

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The special laminated insulating rings and tough rubber seals operate at temperatures up to 350° F.

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South-Central Nebraska stirs with new action

Harlan County in southern Nebraska now has three oil pools as a result of W. E. Wickizer's success at 1 Bottin in C N½ 15-2n-18w, 3 miles north of the town of Alma. This brings to three the number of fields in the vast South-Central Nebraska basin, one of the country's largest and least-explored future oil provinces.

The 1 Bottin was completed pumping 35 bbl. of oil per day from Kansas City-Pennsylvanian through several sets of perforations from 3,396 to 3,565 ft.

Wickizer's discovery is 8 miles northwest of Guy F. Atkinson 1 Hofmeyer, a September 1957 Kansas City lime discovery. That well made 12 bbl. per day. There is another small field near the state line. Nearest big production is across the line in Kansas at Huffstutter field, a Phillips County field that lies off the northeast flank of the northern end of the Central Kansas uplift.

THE HUGE and practically nonproductive South Central Nebraska basin gained its third oil pool. Location is Harlan County on the south border of the state.

Northwestern Oklahoma chain keeps sprouting as . . .

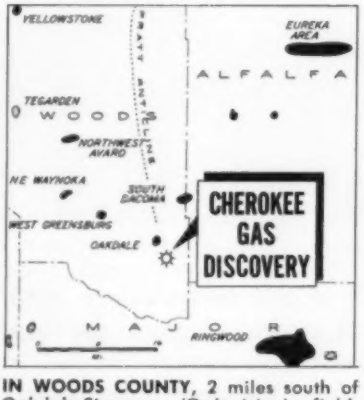
Woods County adds another field

WOODS COUNTY in northwestern Oklahoma added another field to the chain of producing areas that have been popping up since Yellowstone field was opened 5 years ago. The new discovery is a Cherokee-Pennsylvanian gas success at Falcon Seaboard Drilling Co. 1 Gisson in C SE NE 33-24n-13w.

A drill-stem test in the Cherokee at 6,329-55 ft. got 2,721 M.c.f. of gas per day. Recovery was 420 ft. of heavily gas-cut mud. Operator is now drilling ahead.

Old trend grows . . . The new discovery in Woods County adds another link to the cluster of oil and gas fields around the southwestern flank of the Pratt anticline jutting south from Kansas. It all began in 1953 at Yellowstone field on the state line when Arbuckle oil was discovered. Then came Northwest Avard, Tegarden, and Northwest Oakdale fields. The Oakdale field area proved to be the most prolific and successful on the Oklahoma side of the play. Amerada Petroleum Corp. established Cherokee gas production, Layton Pennsylvanian gas, and Simpson-Ordovician oil at Oakdale.

After Oakdale came Northeast Waynoka-Cottage Grove (Pennsylvanian) field, West Greensburg-Miser (Mississippian) and Hunton (Siluro-Devonian) field, Northwest Helena, and Dacoma fields in Alfalfa County to the east.



IN WOODS COUNTY, 2 miles south of Oakdale-Simpson (Ordovician) field, Falcon Seaboard Drilling Co. opened Cherokee-Pennsylvanian gas production at its 1 Gisson wildcat.

The new Woods County success is just another chapter in the glowing new oil and gas era unfolding in northwestern Oklahoma. Rank new fields are being opened in Major, Woodward, Harper, and Ellis counties. Woods County is particularly attractive to the drill because of its location on the flanks of the Pratt anticline and its position on the northeastern shelf of the Anadarko basin where odds are excellent for big strat traps.

There are at least 10 different pay targets in the Woods-Alfalfa County region—all at reasonable depths. Southeastern Woods County and southwestern Alfalfa County should really see some exploratory action in the coming months. The recent Cherokee successes in the Dacoma and Oakdale areas seem to point to a southward shift of drilling from the prolific Eureka trend of northern Alfalfa County.

This new play, coupled with the fast-moving campaign in Woodward, Ellis, Major, and Harper counties to the west and southwest will give northwestern Oklahoma a lively drilling program in 1958.

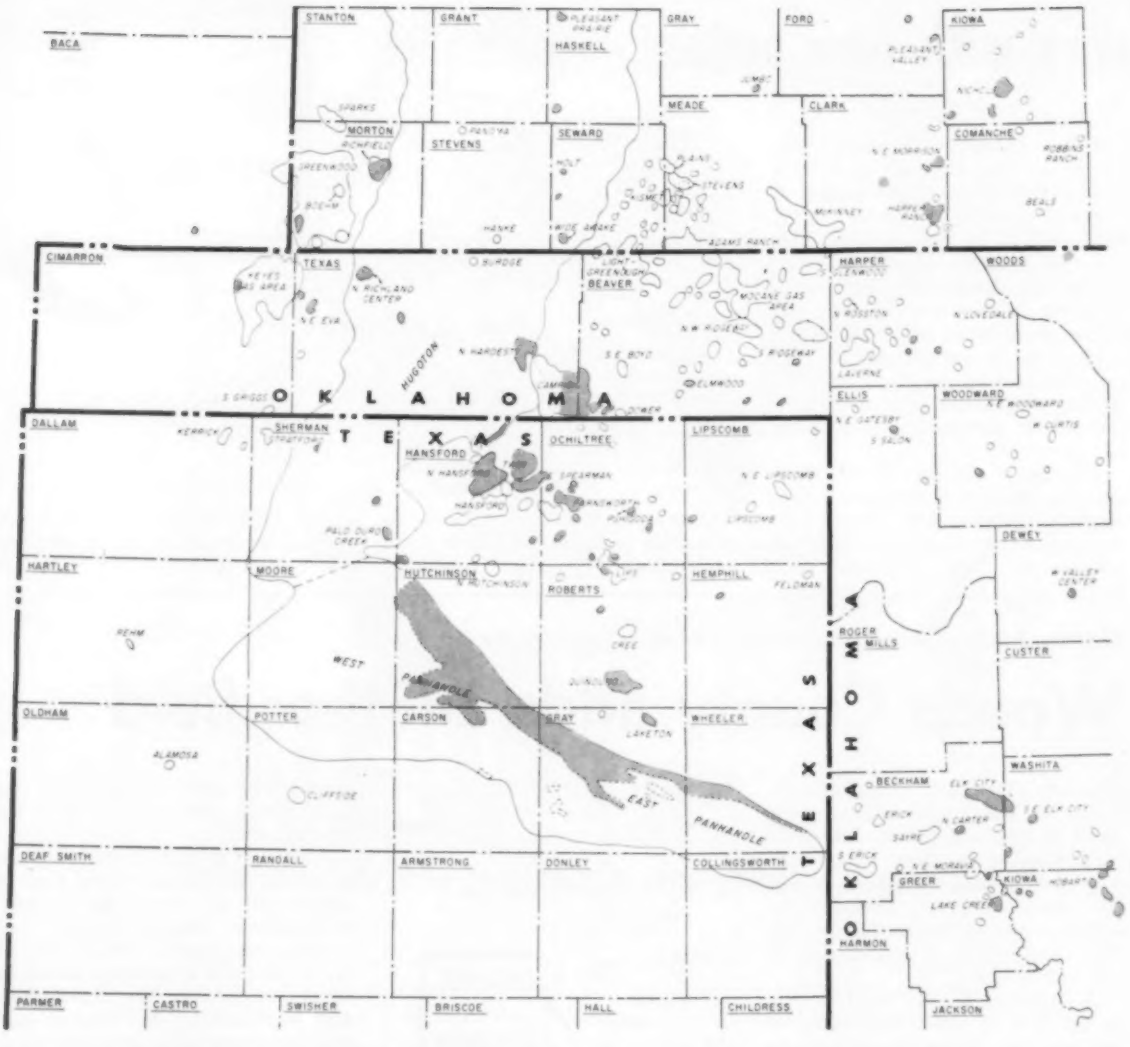
NORTHWEST

Shell Oil Co. added the fourth producer to new Northeast Catesby field in Ellis County. The new well is 1-30 Tubb, C SW NE 30-24n-25w.

An open flow test of Morrow-Pennsylvanian perforations at 8,105-15 and 8,121-36 ft. got 12,700 M.c.f. of gas per day, plus 2 bbl. of condensate per million feet of gas. Gravity of the condensate is 65°.

Northeast Catesby field was opened

N. W. OKLA. & TEXAS PANHANDLE



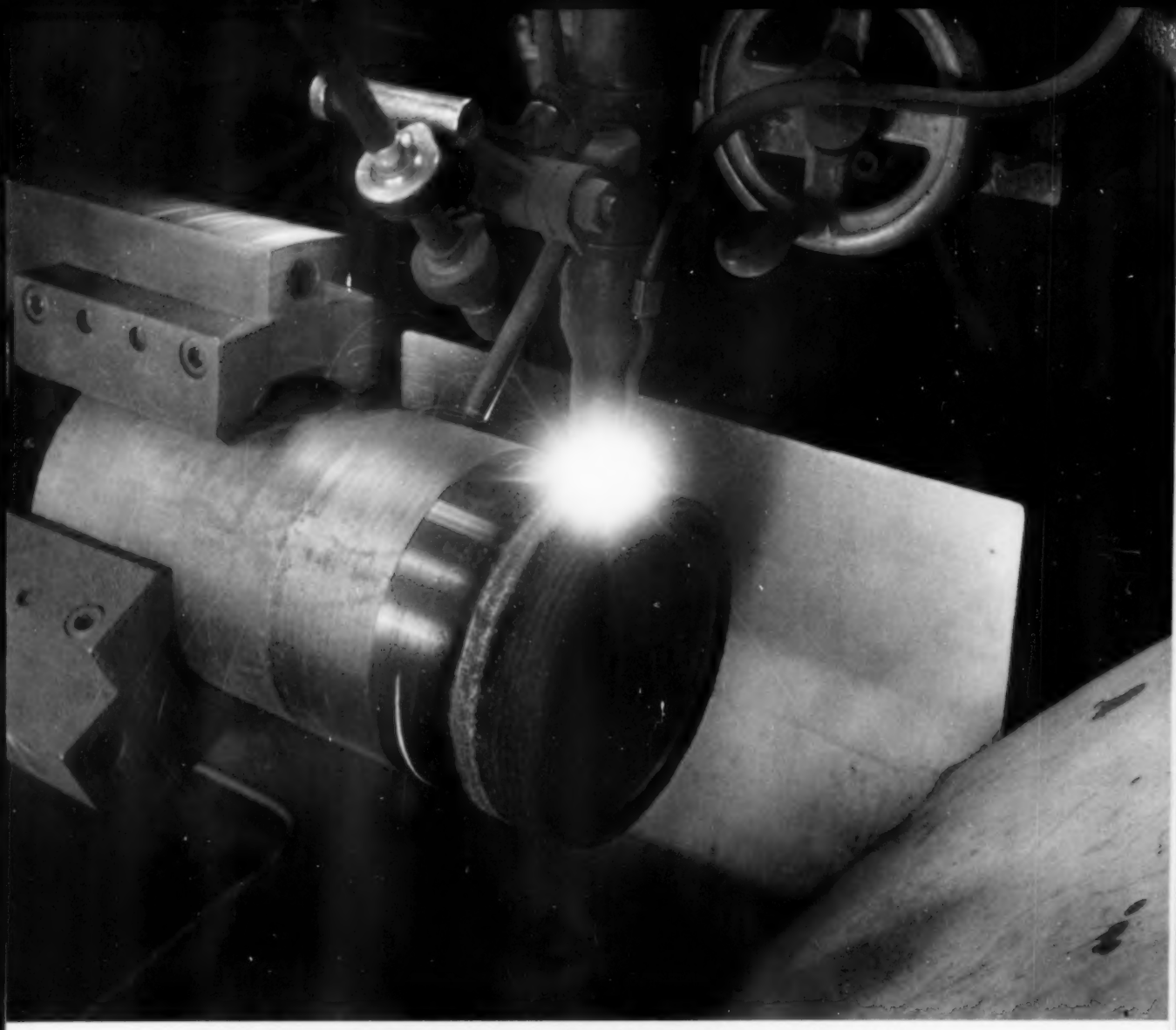
THIS UP-TO-THE-MINUTE MAP of the northwestern portion of the Anadarko basin and its environs shows clearly what exploratory and development interest can do to an area that 10 years ago had no production except the old Hugoton gas field and the vast Panhandle fields of Texas. During the past 6 years, a brisk pre-Permian drilling campaign has been under way in southwestern Kansas, southeastern Colorado, and the Oklahoma and Texas panhandles. The many oil and gas fields shown here are a lucid display of the results of this drilling program.

last year, reviving production in Ellis County. Since the field was opened, two other fields have made their appearance in this northwestern Oklahoma county. The Ellis County play is part of the rapidly growing "Woodward Trend"—a play that began near the city of Woodward about 2 years ago and now covers Woodward, western Major, Harper, Ellis, and Blaine counties.

New Strike Extends Southeast Bradley Field

The six-well Southeast Bradley-Simpson Ordovician field in Garvin County, south-central Oklahoma, gained its southernmost extension at Ada Oil Co. 1 J. O. Bullock, NE NE 5-4n-4w.

The extension strike is being dually completed in the middle Hart sand (gas-distillate reservoir of Pennsylvanian Deese), and the First Bromide sand of the Simpson. From Hart sand perforations at 8,146-70 ft. on a 4½-hour test on 25/64-in. choke, the flow stabilized at 1,870 M.c.f. per day plus 60 bbl. of 60°-gravity distillate. From First Bromide sand perforations at 11,150-225 ft. the well flowed



Multiple bands of tungsten carbide are continuously overlapped on this Spang tool joint as it rotates at a constant, predetermined speed.

Why Spang Banded Hardfacing is unmatched

Spang Hardfacing affords the best protection ever developed for tool joints in abrasive formations.

The method of application is the tungsten inert gas welding process. Multiple bands of tungsten carbide are continuously overlapped on the scale-free surface to form a solid band. In the tungsten inert gas welding process, the tungsten carbide particles are automatically "plowed into" the joint surface in exact, metered quantities. No grooves are required for this application, and everything is automatically controlled to eliminate human error. Each joint is pre-heated to further insure a perfect bond between the parent metal and hardfacing material. Each tool joint is stress relieved after hardfacing to make sure the physical properties of the parent metal are not impaired.

The results of these careful operations are: high saturation and uniform distribution of tungsten carbide particles—on the surface *and* throughout the depth of the deposit; a solid band of protection—providing a surface resistant to abrasion where the wear occurs; high resistance to chipping because of the solid particle-to-metal bond.

Spang Hardfacing is a typical result of National's product research and development program. Like all Spang processes and products available at National Supply, quality control insures its superiority.

Why operators buy
Spang Drill Pipe and Tool Joints

When the drilling schedule is difficult, it pays to have a quality drill string. Operators buy Spang Drill Pipe because they know that its performance has been proven in countless wells.

Look at these features of the two types of Spang Tool Joints.

Spangweld—Tool joints are welded to the drill pipe by an automatically controlled operation assuring accurate alignment and a high quality weld. Welding permits a streamlined contour and a reduced initial cost due to elimination of numerous machining operations.

Spang Double Seal Shrink Thread—Tool joints can be removed and replaced in the field, saving the cost of returning the string to a field shop. Joint design has an outer seal, threads, and inner seal all on a single cone. This insures uniform, reliable installations both at the mill and in the field, and completely seals against internal and external pressures.

As well depths and costs increase, these are desirable drill pipe features to rely on. Moreover, you can get the extra protection of Spang Banded Hardfacing (either "Banded Medium Density" or "Banded High Density") for abrasive service conditions, and Spang Plastic Coating for corrosive conditions (see below).

Specify Spang Drill Pipe for your tough jobs, and you'll get a good start toward lower operating costs!

If you need maximum protection against corrosion, specify Spang Plastic Coating. Scientifically applied at the mill with specially-developed facilities, it is the best you can buy. Available in Spang Drill Pipe, Tubing and Line Pipe (shown here).

◀ Spangweld and Spang Double Seal Shrink Thread Drill Pipe are available in a full range of sizes, including diameters for slim hole operations.

Protect a good drill string with National Collars—next page . . .

To insure true straightness, the entire length of a National Drill Collar is carefully gauged. Core samples from the trepanning operation are examined and measured for bore concentricity.

Why National Drill Collars give extended service

Proper joint design and rigorous manufacturing standards are the reasons why you obtain outstanding drill string protection when you specify National Drill Collars. Made from alloy steel, these precision collars are hardened and tempered full length for high strength. True center bores are machined on a special lathe designed for this purpose. In the threading operation, a stress relief groove is made in both box and pin to provide maximum fatigue resistance.

The results are drill collars that promote maximum penetration rates at all drilling speeds, and extend the service life of your drill string. See a National Supply representative soon about the drill collar sizes to meet your needs.

National Drill Collars are simultaneously bored from both ends on a 165-ft. trepanning lathe especially designed for this purpose.

SPANG-CHALFANT DIVISION

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.

DIVISION TUBULAR OFFICES: Denver, Colorado; Houston, Texas; Fort Worth, Texas; Los Angeles, California; Toledo, Ohio; Tulsa, Oklahoma; Calgary, Alberta, Canada

NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

215 bbl. of 45.2°-gravity oil on16/64-in. choke on a 24-hour test.

The Bullock well is located 1,200 ft. southwest of the Sun Oil Co. 1 Burns, a dually completed well in the same zones. Bullocks well is the southernmost well in the six-well producing area.

Ada's well is located on the northwest flank of the Pauls Valley uplift and near the southeast corner of the Anadarko basin.

ROCKY MOUNTAINS

WYOMING

El Paso Shuts In Desert Springs Discovery

El Paso Natural Gas Co. shut in the 1 Desert Springs unit in Sweetwater County after gaging gas at the rate of 7,800 M.c.f. per day from 5,885-5,955 ft. in the Mesaverde.

This wildcat, located in N½ SE 26-21n-98w, on the east side of the Green River basin, has stirred new exploratory interest in this basin. El Paso reports it will drill a second well on the 28,000-acre Desert Springs unit. The 2 Unit, SE NW SE 22-21n-98w, will also go for the Mesaverde.

MICHIGAN

Bard Field Headed For Revival

Revival of development in the old Bard oil-field area, Gladwin County, is probable with a ½-mile south extension test swabbing 20 to 30 bbl. oil per day on preliminary production tests.

Strike was made by W. B. Stewart and Basin Oil Co. on 1 Lang SW NW NE 6-17n-2w, Beaverton Township. Test logged Dundee at 3,901 ft. and pay at 3,958-61 ft., showing 2,500 ft. of fluid in 36 hours. On swab, well recovered 24 bbl. first day and ranged later from 20 to 30 bbl. Operators will put test on pump.

Bard pool was discovered in 1949 by Walter L. McClanahan with 16 producing wells drilled. There had been no development since 1951.

NORTH DAKOTA

Rival Confirmation Flows Madison Oil

The confirmation well to new Rival field in Burke County flowed 160 bbl. of oil in 19 hours on 14/64-in. choke from Nesson-Madison Mississippian perforations at 6,087-6,107 and 6,114-20 ft. The well is Mobil Producing Co.'s F-31-20-P Probst, C NW NE 20-163n-92w.

The discovery well was completed last year by Arrowhead Exploration Co. The 1 Probst, W½ SE SE 17-163n-92w, flowed 56 bbl. of oil per hour on 30/64-in. choke. Pan American Petroleum Corp. went in to the play at a north extension try, but it failed. The new Mobil success is the southwest offset to the field discovery well. Rival field is 4½ miles northeast of Columbus field and 6 miles northwest of Lignite field.

LOUISIANA

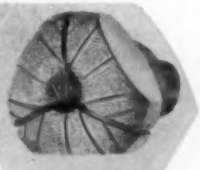
SOUTH

Deep Gas Pay Opened In Turtle Bayou Discovery

Shell Oil Co. has a new deep discovery well about 2¼ miles north of Turtle Bayou field, in northwestern Terrebonne Parish.

It is its 1-A Continental Land & Fur Co., which tested 4.5 M.M.c.f. of gas per day through 15/64-in. choke from perforations at 14,158-68 ft. Flowing pressure was 4,000 psi.

HARNESS ALL YOUR HORSEPOWER



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Use ALL available horsepower with D&S custom designed bits . . . NOT a small fraction of it. Tri-Dia jet bits should be ordered to fit specific conditions, not as "on-the-shelf" items. Volume circulated, type mud, formation and rock bit footage are factors that determine D&S jet bit design to give efficient peak performance on your job. WRITE TODAY!

Drilling & Service INC.

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DIAMOND DRILLING EQUIPMENT

6210 NORTH CENTRAL EXPRESSWAY • DALLAS, TEXAS

OFFICES IN ALL PRINCIPAL OIL AREAS

"Well, what in blue blazes does old Nosey wear a tie on this job for anyways?"

STUART P. KING

Foreign Prospects Sized Up

. . . for TGT by new overseas manager. King fills key post as company eyes expansion of international activities.

THE MANAGER of Tennessee Gas Transmission Co.'s new overseas department is a globe-trotting Canadian who speaks Spanish with an Irish brogue.

Calgary-born Stuart P. King arrived in Houston from Canada early in January to take over as head of a three-man department. Within 10 days the department had expanded to about 15 men, and King was packed for a 3-week tour of TGT properties in South America.

With TGT in one of its typical expansion moods—this time looking toward development of overseas oil production—there's no telling what part of the globe King will be heading for next.

Tennessee Gas made its first plunge into overseas oil in the fall of 1956. The company now has an interest in blocks of acreage in Venezuela and Bolivia and is on the lookout for more. King's job, as he sees it, is to study and make recommendations on oil prospects in any foreign country where the geology, economics and politics are considered favorable.

Before joining Tennessee Gas, 42-year-old King was managing director of Merrill Petroleums, Ltd., at Calgary (OGJ, Dec. 23, 1957, p. 121).

Hockey scholarship . . . If money had been a little more plentiful in the King household 25 years ago, perhaps Stuart King would be a physician today instead of a petroleum engineer. He might have reached this goal anyway if athletic scholarships at the University of Southern California had been good in the school of medicine.

But when he thinks of "all the people who are probably alive today" because he didn't become a doctor, King is happy over the circumstances that led him to a career in oil.

"As my mother would say, God had his arm around my shoulder."

After finishing high school in Calgary, King worked at odd jobs for 5 years. Gradually, his skill as a hockey player became more important than his job at the local newspaper office or packing plant. King lost three front teeth playing hockey, but he gained an education.

While he was playing "senior" hockey—just one step below the professional leagues—Southern Cal boosters were scouting Canada and northern states for hockey talent in hopes of building the school's team to national prominence. King won a scholarship.

When King started at Southern Cal he enrolled in premedicine. After a semester he switched to petroleum engineering. His scholarship then would be good for 4 years instead of 2.

Before graduation, he and his teammates succeeded in winning two games straight from the University of Minnesota's perennial champions. On one tour they defeated every team

Personals

Ray Parker, formerly with The Texas Co. in Long Beach, Calif., has joined Texas City Refining, Inc., Texas City, as unit foreman.

Donald G. Cook has left Midstates Oil Corp., where he was geologist in Midland, Tex., to join Kern County Land Co. as district supervisor of its new Permian basin district office in Midland.

Frank L. Wallace, manager of The Texas Co.'s Port Arthur, Tex., refinery, has retired. Wallace joined Texaco as a mechanical engineer at Port Arthur in 1920. He was named works manager there in 1943.

George B. Sewell, geologist, has been transferred to Oklahoma City from Tyler, Tex., by British-American Oil Producing Co.

C. Kenneth Eilerts, scientist at the U. S. Bureau of Mines petroleum experiment station at Bartlesville, Okla., since 1930, has received the Department of Interior's highest honor, the Distinguished Service Award. Eilerts, a graduate of Oklahoma State University, received the Government's Award of Excellence in 1944 for his development of mobile equipment and test methods used by the Petroleum Administration for War. He has also pioneered work in corrosion control.

John B. Nunn has been elected a vice president of McRae Oil & Gas Corp.

L. G. (Gayle) Rodgers, general manager of Sunray Mid-Continent Oil Co.'s gas division, has returned to Sunray in Tulsa after a year's service with the Department of Interior's Oil and Gas Division.

W. K. Warren, chairman and chief executive officer of Warren Petroleum Corp., has been elected to the executive committee of Gulf Oil Corp. Warren has been a member of Gulf's board of directors since May, 1956, when Warren Petroleum was merged with Gulf.

they met except one. The loss was to a Canadian team.

Industry experience . . . Leaving college in wartime 1941, King returned to Canada. He was married a few months later to Ruth Setterington, of Calgary. "She's a bloody limey," he says in a brogue which sounds as if it just arrived from the Old Sod. "How I married her I'll never know."

In answer to Canada's technical manpower draft King went to Trinidad soon after his wedding and became production engineer for Trinidad Leaseholds, Ltd. Later he joined Trinidad Consolidated Oilfields, Ltd., as production superintendent.

In 1945 the Kings moved to Venezuela where he joined Creole Petroleum Corp. as petroleum engineer.

Returning to Canada on vacation in 1949 after 8 years. King found the Leduc area booming. He and his wife decided to settle in Calgary again. By then their two oldest children, both born in Trinidad, were speaking Spanish fluently.

In 1950 King joined Franco Oils, Ltd., as vice president. He later held executive positions with several other Canadian oil companies before joining Merrill in 1955.

On his new job with TGT King will maintain headquarters in Houston. His wife and family plan to move there from Calgary after school is out next spring.

In the meantime, King hopes to find a home in Houston—a big home. For his wife, despite her English ancestry, has done right well by the Irish race. The Kings have six children—Michael Patrick, William Patrick, Shannon Patricia, Shelley Pauline, Kevin Stuart and Kathleen Cecilia.

C. K. Taylor, Delta Engineering Corp. field superintendent, has transferred to Big Spring, Tex., from Crane, Tex.

James Clarke and **Harry Moore** have been appointed senior engineering associates by Esso Research & Engineering Co.

E. B. Barnes, director of organic research for Dow Chemical Co.'s Texas division, and **C. M. Shigley,** director of technical research, have been named to the Texas division executive board. **Dr. A. P. Beutel,** division general manager, will serve as chairman. **R. H. Smith,** general superintendent of chlorinated C_2 chemicals, has been appointed to the division's operating board.

Herbert Alberding has joined Signal Oil & Gas of Venezuela as exploration manager. He formerly was in charge of Phillips Petroleum Co.'s subsurface geological section in Venezuela.

W. H. Garbade, president of Crescent Corp., **Fred Skelcher,** former president and managing director of Canadian Admiral Oils, Ltd., and **John M. Robertson,** Calgary attorney, have been elected directors of Canadian Homestead Oils, Ltd. Their election brings the Canadian Homestead board to 10.

Austin D. Brixey, Jr., Sinclair Oil & Gas Co.'s Beaumont, Tex., district geologist, has been promoted to Houston division geologist. The change follows consolidation of the Beaumont district, into the Houston district. In other moves, **John M. Currie,** senior geologist in Corpus Christi, Tex., district, has been promoted to acting district geologist. **W. K. Denham, Jr.,** senior geologist in the Lafayette, La., district geological department, has been named acting district geologist. Named acting district geophysicist in Corpus Christi is **F. C. Hall,** senior geophysicist there. Also, **Rems C. Heiny,** senior geologist in the Beaumont district, has been promoted to acting Houston district geologist. **Leycester Stanley,** senior geophysicist in the Houston division, has been named Houston district landman.

Personals

Hal F. Nabors, assistant central region manager in Oklahoma City for Continental Oil Co., has been promoted to general manager. He had been serving as acting general manager since March. Nabors joined Conoco in 1935. He was southern region production manager in Houston before transferring to Oklahoma City in 1955.

Walter B. Mayfield, general foreman of refinery operations at Arabian American Oil Co.'s refinery in Ras Tanura, Saudi Arabia, will retire June 1. Mayfield has been with Aramco 15 years. Before that time he was with The Texas Co. at Houston, Amarillo, and Port Arthur, Tex.

Levi Goodrich has been named vice president and operations manager for Venezuelan activities of San Jacinto Petroleum Corp. **Ray Storms** is vice president and production manager. **Monroe Franz** is drilling superintendent, **James Lewis,** engineer, and **Victor Toepe,** geologist. **Roger Stoneburner,** geologist, has been made a director of the parent company.

Nomads at Houston Name Chapter Officers

Ed Louden, third from left, first row, Baroid Division of National Lead Co., has been elected chairman of the Houston chapter of Nomads. New officers of the group were installed at the Shamrock-Hilton Hotel earlier this month. They include, first row, left to right, W. O. Hedrick, Glaze-Hedrick Manufacturing Co., senior regent; B. W. Pickard, Tuboscope, vice president; Louden; Tracey Word, Jr., Thornhill-Craver Co., junior regent; Harry Estes, Oil Well Survey Instrument Co., executive secretary. Back row, left to right, W. H. Becker, Atlas Pipe Co., sergeant-at-arms; F. S. Mims, Mission Manufacturing Co., assistant treasurer; John W. Gates, Well Equipment Manufacturing Co., secretary; James B. Hughes, Hydril Co., treasurer; A. Lon Smith, Petroleum Instrument Co., assistant secretary; and W. M. Boren, Rolo Manufacturing Co., deputy sergeant-at-arms.

Personals

W. W. TURNBULL

Wade W. Turnbull has been promoted by Carter Oil Co. from assistant exploration manager to manager of the exploration department. He succeeds **Merrill W. Haas,** who will devote full time to his post as vice president and contact director for exploration. Turnbull's promotion sets off a number of changes at Carter. **W. A. Bramlette,** chief geologist, moves up to replace Turnbull as assistant exploration manager. **R. W. Beck,** exploration manager in the southern division, Shreveport, La., will succeed Bramlette as chief geologist. Beck will be succeeded by **James E. Lewark,** exploration manager in Mattoon, Ill. **T. P. Woodward,** assistant to the chief geologist in Tulsa, transfers to Mattoon to replace Lewark. Also, **S. W. Stone,** acting division geologist at Shreveport, has been made division geologist there. **Max E. Ferrell,** geologist in Billings, Mont., has been transferred to Tulsa on training assignment as assistant to the chief geologist.

Dr. A. E. Aho, formerly exploration manager for British Yukon Exploration Co., Ltd., has opened consulting offices in North Vancouver, B. C.

Jack A. Mason has left Skiles Oil Corp. where he was chief engineer in Mount Carmel, Ill., to join Slagter Production Co. as engineer in Evansville, Ind.

John T. Mullen, Jr., formerly senior geologist, has been appointed staff geologist for Northern Pacific Railway Co.'s oil development department. **R. M. Model** becomes senior geologist. **John J. Schulte** has joined the department as a geologist.

D. L. Kastner, assistant division superintendent at Odessa, Tex., for Cities Service Oil Co., has been promoted to assistant general superintendent of the production division. **J. P. Straight,** assistant general superintendent since 1954, will continue in this position. Naming of a second assistant division superintendent resulted from increased activities. **E. L. Cralle,** superintendent of North Odessa production operations, has been promoted to assistant division superintendent there succeeding Kastner.

E. D. Glass has been promoted to production research division supervisor at Cities Service Research & Development Co.'s Tulsa laboratory.

Joseph Nalle, petroleum engineer and assistant vice president for Texas National Bank of Houston, has been promoted to petroleum engineer and vice president.

Richard W. Scott, formerly exploration manager of Warren Petroleum Corp., has been elected vice president of Republic Natural Gas Co. Scott had been with Warren since 1948.

John W. Conwell has been named senior research chemist and **John J. Guyer** has been named chemical engineer in the chemical engineering section of D-X Sunray Oil Co.'s research and technical division, Tulsa.

William H. Rader, senior development engineer at National Petro-Chemicals Corp.'s Tuscola, Ill., petrochemical plant, has been transferred to U. S. Industrial Chemical Co. as assistant production manager for polyethylene resins. Both companies are subsidiaries of National Distillers & Chemical Corp.

T. L. OWEN

T. L. Owen, tool pusher, has been promoted to superintendent of the land drilling division of Rimrock Tidelands, Inc. **G. D. Murray** has been named superintendent of the marine drilling division and will be in charge of the company's four offshore rigs now operating in the Gulf of Mexico. Owen, new land drilling superintendent, was drilling superintendent for Trans-Tex Drilling Co. before its merger with Rimrock Tidelands in 1956.

William J. Wilson, geologist with Shell Oil Co. in Wichita Falls, Tex., has been elected president of the newly formed Southwestern Federation of Geological Societies. Charter members of the federation are members from societies at Abilene, North Texas (Wichita Falls), Dallas, Fort Worth, West Texas (Midland), San Angelo, Lubbock, and Roswell, N. M. Other officers are **Gene Couch,** Pan American Petroleum Corp., Lubbock, vice chairman; **Ross H. Ley,** Sun Oil Co., Midland, secretary; and **Frank Perkins, Jr.,** Schlumberger Well Surveying Corp., Lubbock, treasurer.

Robert P. Cahn has been named engineering associate in Esso Research & Engineering Co.'s planning engineering division. Cahn has been with Esso since 1947.

W. C. Goins, Jr., has been appointed head of the drilling section, production engineering division, at Gulf Research & Development Co.'s Harmarville, Pa., research center. **R. J. Goodwin** has been named head of the well completion section there.

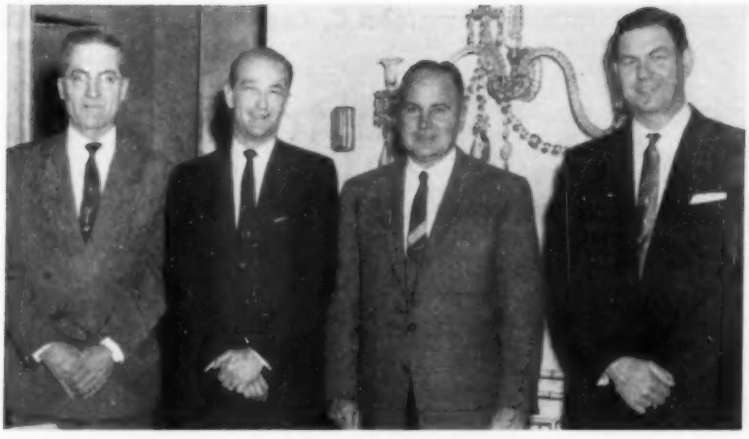
W. R. STEPHENS

W. R. Stephens, chairman of the board of Arkansas Louisiana Gas Co., has been elected president. He will continue as chairman. Stephens succeeds the late J. C. Hamilton. Also **D. W. Weir,** formerly vice president, has been named executive vice president, a new position, and a director. **Lindsey Hatchett,** president of Pitts & Bryant Co., Inc., a subsidiary, has been elected vice president of the parent company.

William C. Elliott, Jr., assistant chief of the Dallas office of the U. S. Bureau of Mines, has been transferred to Wichita Falls, Tex., as chief of the Bureau's office there.

Albert W. (Bob) Gentry, manager of field operations for Monterey Oil Co., has been promoted to vice president for operations. Gentry was with Shell Oil Co. and Long Beach Oil Development Co. before joining Fullerton Oil Co. in 1952 as manager of field operations. He continued in this capacity after Fullerton was sold to Monterey.

J. P. Schmalz, division production manager for Tennessee Gas Transmission Co. at Midland, Tex., has been named division production manager at the company's new Mid-Continent division office in Oklahoma City. He will be succeeded at Midland by **J. P. Jacks.** Also assigned to the Oklahoma City office are **H. E. Rowe, Jr.,** division petroleum engineer; **William Miskimins, Jr.,** production foreman, and **W. F. Lewis,** division production office manager. In other TGT changes, **L. B. Plumb,** has been appointed division petroleum engineer at Midland. **L. C. Bodemann, Jr.,** becomes division petroleum engineer, and **J. L. King,** division production office manager, at Denver. **L. P. Miller** has been named district petroleum engineer at Oklahoma City.



Houston API Chapter Installs Officers

Thomas (Tucker) Pennington, second from right, Humble Oil & Refining Co., has taken over as chairman of the Houston chapter of the Division of Production of the American Petroleum Institute. Other officers are, left to right, B. O. Ellington, Barber Oil Tools, Inc., second vice chairman; R. M. Darling, Pan American Petroleum Corp., first vice chairman; Pennington; and E. W. Fore, Jr., Parkersburg Rig & Reel Co., secretary-treasurer.

Personals

Charles R. Dodson has been appointed vice president in the petroleum department of First National City Bank of New York.

John M. Cochrane has resigned as division geophysicist for Ashland Oil & Refining Co. in Oklahoma City to open consulting offices there.

J. R. Cutler has been transferred by The Texas Co. from its Port Arthur, Tex., refinery, where he was assistant superintendent of light-oil processing, to the West Tulsa refinery, where he will be assistant refinery superintendent. At Tulsa Cutler succeeds **J. J. Rasor,** who has resigned.

D. F. Jahns, division mechanical engineer for Shell Oil Co. at Odessa, Tex., has been transferred to Midland, Tex., in the same capacity. Also transferred from Odessa to Midland in relocation of the division office are **H. Irvin Smith, John Stanzione, Joe Irons, Fred Gibbs, Ralph Thomas,** and **Frank Angebrandt,** mechanical engineers.

Joseph M. Sexton, manager of purchases for Ste. Kellogg, Paris subsidiary of M. W. Kellogg Co., has been named general manager of the subsidiary. **B. W. Jesser** has been named manager of Kellogg International Corp., London subsidiary. Jesser replaces **F. E. Johnson, Jr.,** who was recently named assistant engineering vice president of the parent company.

Charles A. Sweningsen has been named manager of the newly created construction department of Southern Counties Gas Co. of California.

James A. Richardson, vice president of James Richardson & Sons, Ltd., Winnipeg, has been named a director of Hudson's Bay Oil & Gas Co., Ltd.

H. A. Scott, Jr., petroleum engineer with Ohio Oil Co., has been named supervisor of the western Oklahoma and southwestern Kansas division, Liberal, Kans.

R. Franklin Parker, supervising engineer with Bechtel Corp., for the past 3 years, has joined Petrol-Structors, Ltd., as executive vice president, general manager, and a director.

J. R. Heggblom, Fort Worth senior staff geophysicist for Gulf Oil Corp., has been named chief geophysicist for Gulf operations in Bolivia.

Henry J. Lewis has been promoted by Kroker Drilling Co. from tool pusher in Emmett, Idaho, to drilling engineer in Kingsburg, Calif.

Ben H. Means, formerly production engineer with Cities Service Oil Co. in Oil Hill, Kans., has joined El Paso Natural Gas Co. in Farmington, N. M., as senior petroleum engineer.

W. K. JACKSON

W. K. Jackson, formerly director of Cosden Petroleum Co.'s chemical division, has been appointed vice president of research and development for Vickers Petroleum Co., Inc. Jackson will serve as assistant to the president and will work with **Arthur B. Mullaly,** vice president of market and market development, and **Dewey Mark,** general sales manager, in organization of Vickers Chemicals, new division of Vickers Petroleum.

John G. Rye, Richfield Oil Corp. petroleum engineer in Bakersfield, Calif., has been promoted to petroleum engineer working in unit and foreign operations in Los Angeles.

DEATHS

Leo P. Fagan, 49, Tulsa, president of Braden Steel Corp., died January 26 in Tulsa after a heart attack. Fagan moved up from executive vice president to president of Braden in 1954.

Otto Glenn Pratt, 75, retired traffic manager for Sinclair Oil & Gas Co., died January 24 in Tulsa.

David E. Pierce, 65, retired chemical engineering consultant, died January 22 in Philadelphia. Pierce was with Du Pont and Atlantic Refining Co., before becoming a consultant.

M. S. Rehders, president of Rehders Oil & Gas Specialty Co., Farmington, N. M., was killed January 18 when the company plane he was flying slammed into power lines 20 miles north of Albuquerque and crashed. Rehders had taken off from Farmington en route to Albuquerque and apparently became lost in a drizzling rain storm over the Rio Grande Valley.

J. A. Floyd, 80, of Casper, Wyo., former drilling superintendent for Sinclair Oil & Gas Co., died recently after an extended illness.

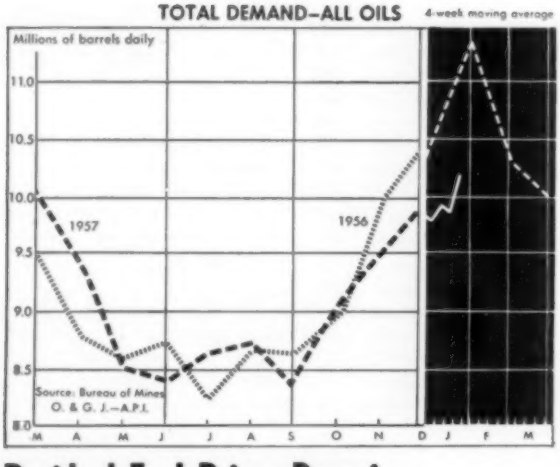
C. H. Lindsay, 56, Carter Oil Co. district superintendent in St. Elmo, Ill., died January 21 after a heart attack.

Frederick W. Crail, 57, Long Beach, Calif., secretary of Victory Oil Co., died recently in Palm Springs, Calif. Crail went to California from Pennsylvania about 40 years ago. He entered the oil industry as a roughneck in Kern County oil fields.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,926,335	UP	4,050	DOWN	551,544
Crude stocks	277,065,000	UP	468,000	UP	20,319,000
Completions	959	DOWN	159	DOWN	137
Refinery runs	7,639,000	DOWN	36,000	DOWN	550,000
Gasoline stocks	203,256,000	UP	2,620,000	UP	10,008,000
Kerosine stocks	24,051,000	DOWN	1,292,000	DOWN	1,568,000
Distillate stocks	128,181,000	DOWN	7,225,000	UP	21,691,000
Residual stocks	57,810,000	DOWN	142,000	UP	18,279,000
Four-product stocks	413,298,000	DOWN	6,039,000	UP	48,410,000
Total imports	1,590,800	UP	229,400	UP	243,100



Residual Fuel Prices Drop in Three Major Marketing Areas

RESIDUAL-FUEL MARKETS are softening in most areas of the country. There has been a tendency toward weakness for some time, but the problem has become critical in the past few weeks.

The depressing force stems not so much from high inventories in the major marketing areas as from lack of demand for this industrial fuel.

Total residual stocks in all refining areas show a gain of about 17,000,000 bbl. over 1957 and 19,000,000 bbl. over 1956. But, most of the increase is in California. California stocks are up about 14,600,000 bbl. over last year and 15,300,000 bbl. over 1956.

For all areas east of California, residual stocks top last year's totals by about 2,300,000 bbl. California stocks have more than doubled since last year. For the rest of the country the increase has been about 8.0 per cent.

Some refiners, particularly in the Mid-Continent area, believe that residual fuel was priced out of its normal market sometime in 1956 or 1957. Low-sulfur residual moved above $2.00 a barrel at the end of 1955. Domestic demand for all petroleum products increased 9.0 per cent that year, and residual demand was up 6.6 per cent.

Prices held at $2.00 or above for all of 1956. After the Suez Canal was closed at the end of October that year, there was a big increase in export demand for heavy fuel on the Gulf Coast. Prices moved up a little more after the crude price increase in January 1957.

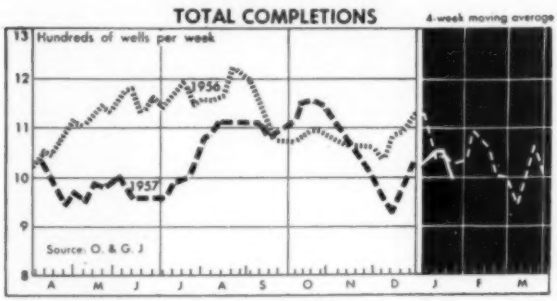
Any surplus Group 3 fuel could move to the Gulf Coast at a price that would give a good netback to the Mid-Continent refiner. The result was that shipments to the normal northern market went only to customers who were willing to pay prices of about $2.40 for low-sulfur residual.

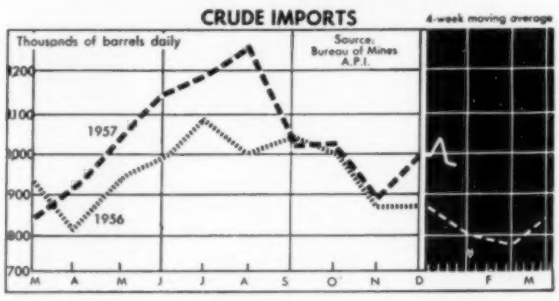
Tank car shipments from the Mid-Continent to the Gulf Coast were continued on a reduced scale through the summer of 1957 and were stepped up again in the fall. When weakness developed in the Gulf Coast market, prices were lowered and shipments fell off. Some Mid-Continent refiners began to speculate on what would have happened to the Group 3 residual market in the 1956-57 winter if there had been no shipments to the Gulf Coast. They have found the answer this winter.

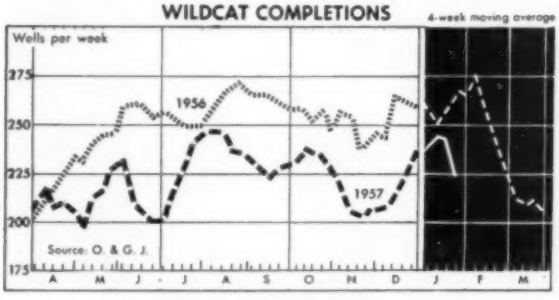
Tank-car movement to the Gulf Coast is down. Group 3 suppliers have plenty of low-sulfur material available at $1.25 a barrel for spot sales. Offers to resellers may be as low as $1.05 a barrel for high sulfur.

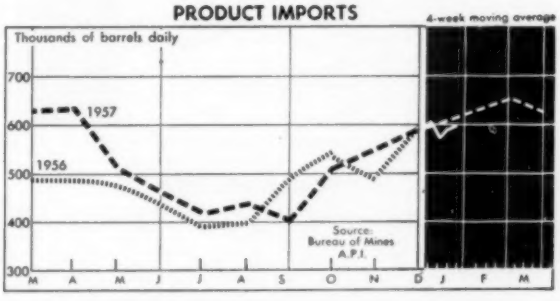
On the East and Gulf coasts, Esso Standard Oil Co. reduced residual prices 20 cents a barrel. This cut has been met by most suppliers in the areas. The East Coast change followed a cut on the Gulf Coast.

The new barge price in New York Harbor is $2.75 a barrel. The Gulf Coast cargo price is $2.35. Even after the reduction, the Gulf Coast price is high in comparison with Group 3 material.







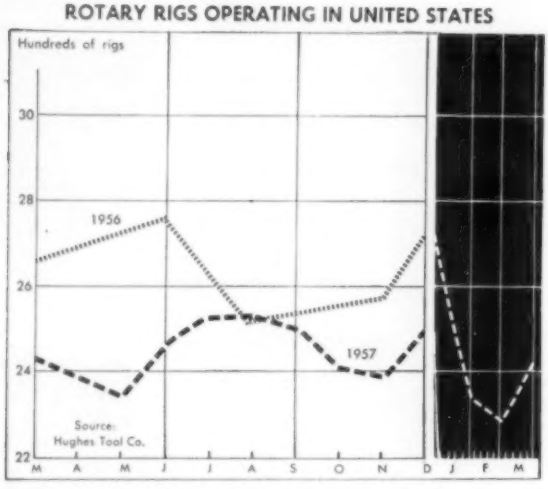


WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 25, 1958

	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1958	1957	Total	Crude	Cond.	Gas	Dry	1958	1957
Alabama	2	0	0	0	2	0	16,704	8	1	2	0	0	0	2	4	1
Arkansas	12	11	0	0	2	0	37,751	66	87	4	2	0	0	2	13	12
California	31	22	0	2	7	0	153,836	163	170	5	1	0	0	4	26	47
Colorado	8	1	0	1	6	0	36,268	40	104	7	1	0	1	5	19	73
Illinois	38	16	0	0	22	0	84,239	116	185	9	1	0	0	8	33	48
Indiana	27	7	0	1	19	0	47,969	60	56	14	1	0	0	13	22	11
Kansas	58	20	0	3	33	2	211,962	285	308	17	3	0	2	12	74	67
Kentucky	17	4	0	4	9	0	26,369	73	127	5	0	0	1	4	10	31
Louisiana	87	41	8	10	28	0	630,058	274	294	10	2	1	3	4	41	52
North	40	26	0	8	6	0	131,760	93	136	5	2	0	3	0	22	13
South	37	10	7	2	18	0	395,597	144	122	5	0	1	0	4	19	36
Offshore	10	5	1	0	4	0	102,701	37	36	0	0	0	0	0	0	3
Michigan	5	1	0	2	2	0	12,544	22	31	1	0	0	1	0	8	15
Mississippi	7	2	0	0	5	0	71,553	40	19	5	1	0	0	4	22	8
Montana	11	3	0	1	7	0	66,437	39	33	7	0	0	1	6	21	11
Nebraska	8	1	0	0	7	0	49,667	53	53	4	1	0	0	3	26	36
New Mexico	50	24	0	19	7	0	214,741	195	142	7	0	0	3	4	33	22
Northwest	28	10	0	16	2	0	96,672	97	54	2	0	0	0	2	15	9
Southeast	22	14	0	3	5	0	118,069	98	88	5	0	0	3	2	18	13
New York	10	5	0	0	0	5	13,500	45	....	0	0	0	0	0	5	....
North Dakota	5	3	0	0	2	0	36,337	34	23	1	0	0	0	1	14	9
Ohio	28	19	0	4	5	0	84,178	62	76	2	0	0	0	2	2	2
Oklahoma	146	82	1	14	48	1	495,121	598	560	18	1	0	2	15	94	73
Pennsylvania	0	0	0	0	0	0	0	0	*21	0	0	0	0	0	0	*4
Texas	380	227	9	14	129	1	1,490,601	1,514	1,666	64	4	0	0	60	342	500
Dist. 1	12	7	0	0	5	0	38,189	67	72	4	0	0	0	4	25	32
Dist. 2	4	1	2	0	1	0	27,266	51	57	0	0	0	0	0	17	23
Dist. 3	21	3	0	0	18	0	113,838	99	149	5	0	0	0	5	20	48
Dist. 4	26	6	4	0	16	0	149,828	94	112	9	1	0	0	8	38	51
East	29	15	1	0	13	0	140,192	118	98	10	0	0	0	10	40	27
Dist. 7-B	61	39	0	0	22	0	145,409	185	240	8	0	0	0	8	53	94
West	107	79	0	2	26	0	483,046	465	447	18	1	0	0	17	79	92
Dist. 9	85	55	0	5	24	1	243,781	335	359	10	2	0	0	8	60	116
Dist. 10	35	22	2	7	4	0	149,052	100	132	0	0	0	0	0	10	17
Utah	9	5	0	0	4	0	54,551	23	13	1	0	0	0	1	5	8
West Virginia	4	0	0	3	1	0	10,147	35	62	0	0	0	0	0	0	5
Wyoming	14	4	0	0	10	0	54,548	66	76	7	0	0	0	7	29	27
Misc. (S. D.)	1	0	0	0	1	0	3,930	14	11	1	0	0	0	1	10	5
Total U. S.	**959**	498	18	78	356	9	3,903,011	3,825	4,118	**191**	18	1	14	158	853	1,067
Total prev. week	1,118	561	21	56	461	19	4,709,423	.....	.....	249	24	3	6	216	.....	.....
Cum. 1957	3,825	1,850	97	261	1,545	72	16,216,887	.....	.....	853	64	9	41	739	.....	.....
Western Canada	38	23	0	2	13	0	201,734	160	101	14	2	0	1	11	46	29

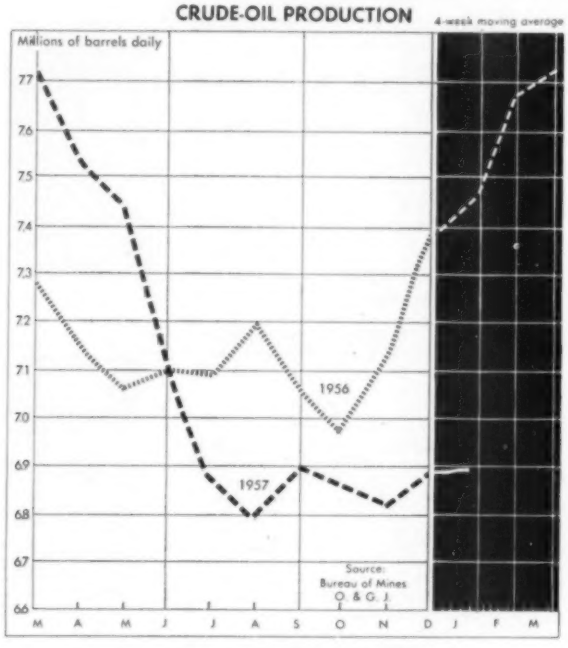
*Includes New York.

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL PRODUCTION

4-week moving average



ACTIVE ROTARY RIGS*

	1-27-58	1-20-58	1-13-58	1-28-57
Alabama	9	8	8	10
Arkansas	15	15	16	17
Arizona	1	1	1	....
California	89	91	91	99
Colorado	33	33	37	43
Florida	1	1	1	2
Georgia	....	....	....	....
Idaho	....	....	....	1
Illinois	24	38	57	38
Indiana	1	5	3	3
Iowa	3	3	3	1
Kansas	104	108	113	144
Kentucky	1	4	6	7
Louisiana	333	341	356	438
North	31	31	37	47
South	231	231	246	291
Offshore	71	74	73	100
Maryland	....	....	....	1
Michigan	7	6	6	10
Mississippi	41	47	51	21
Missouri	....	....	....	....
Montana	27	29	29	20
Nebraska	18	20	18	27
Nevada	....	....	....	1
New Mexico	107	113	116	112
New York	1	1	1	....
North Dakota	40	41	40	27
Ohio	3	2	1	....
Oklahoma	168	190	210	233
Oregon	....	....	....	....
Pennsylvania	10	8	9	9
South Dakota	1	1	1	....
Texas	720	750	787	956
Gulf Coast	144	153	160	223
Offshore	5	2	2	6
West	303	306	312	349
North	232	241	265	316
East	36	48	48	62
Tennessee	....	....	....	....
Utah	47	50	49	38
Washington	....	....	....	1
West Virginia	4	4	4	2
Wyoming	53	47	48	49
Virginia	....	....	....	....
Total United States	1,861	1,957	2,062	2,310
Western Canada	221	208	202	239
Eastern Canada	1	1	2	....
Grand total	2,083	2,166	2,266	2,549

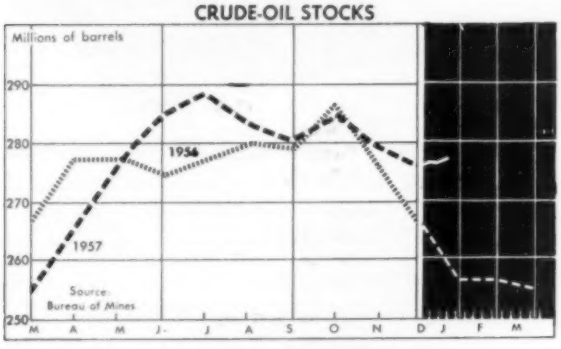
*Hughes Tool Co.

DAILY AVERAGE PRODUCTION FOR WEEK

	January 25, 1958			Jan. 18
	Crude oil	Lease condensate	Total	total
Alabama	15,250	.....	15,250	15,300
Arkansas	81,850	250	82,100	83,550
California	924,300	.....	924,300	928,000
Colorado	140,250	.....	140,250	141,225
Eastern	51,200	.....	51,200	51,000
Florida	1,275	.....	1,275	1,275
Illinois	235,900	.....	235,900	236,600
Indiana	30,200	.....	30,200	30,500
Kansas	†349,675	.....	†349,675	†349,450
Kentucky	41,800	.....	41,800	42,100
Louisiana	756,350	90,000	846,350	846,150
North	112,300	2,500	114,800	114,600
South	644,050	87,500	731,550	731,550
Michigan	25,300	.....	25,300	26,300
Mississippi	101,075	4,325	105,400	105,400
Montana	74,800	.....	74,800	74,200
Nebraska	55,425	.....	55,425	54,925
Nevada	150	.....	150	150
New Mexico	264,385	5,700	270,085	270,085
North Dakota	35,750	.....	35,750	41,800
Oklahoma	†593,000	.....	†593,000	†581,700
Texas	2,665,000	60,100	2,725,100	2,725,100
Dist. 1	46,000	550	46,550	46,550
Dist. 2	119,000	9,400	128,400	128,400
Dist. 3	381,000	29,000	410,000	410,000
Dist. 4	197,000	6,400	203,400	203,400
Dist. 5	32,000	550	32,550	32,550
Dist. 6	117,000	7,000	124,000	124,000
East Texas field	161,000	.....	161,000	161,000
Dist. 7-B	146,000	150	146,150	146,150
Dist. 7-C	147,000	4,075	151,075	151,075
Dist. 8	1,017,000	1,650	1,018,650	1,018,650
Dist. 9	198,000	725	198,725	198,725
Dist. 10	104,000	600	104,600	104,600
Utah	12,825	.....	12,825	13,525
Wyoming	310,000	.....	310,000	303,750
Others	‡200	.....	‡200	‡200
Total U. S.	6,765,960	160,375	**6,926,335**	6,922,285
Change from previous week, up			**4,050**	
Canada	†527,800	.....	†527,800	†481,800
Total U. S. production, January 1-January 25				172,447,215 bbl.
Same period last year (crude plus cond.)				*186,930,105 bbl.

*Includes 3,682,050 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

CRUDE-OIL STOCKS

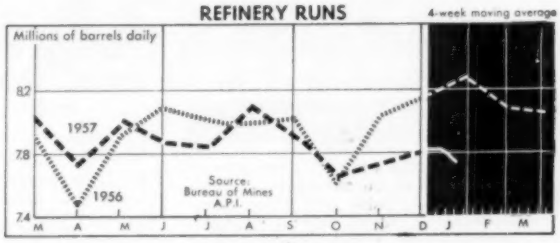


CRUDE-OIL STOCKS BY STATES OF ORIGIN*

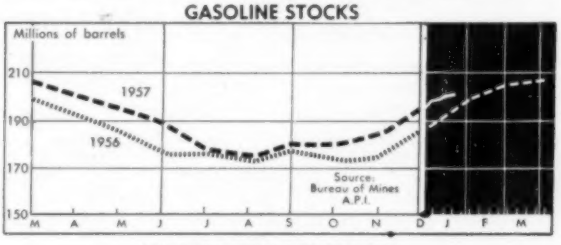
	1-18-58	1-11-58	1-19-57
Pennsylvania Grade	2,888	2,922	2,318
Other Appalachian	1,647	1,618	2,117
Illinois, Indiana, and Michigan	10,932	11,554	10,887
Nebraska and North Dakota	2,464	2,351	2,042
Kansas	9,929	9,954	9,746
Oklahoma	19,559	‡19,257	22,782
Arkansas	2,764	2,723	2,680
Louisiana	19,610	19,836	18,588
North	3,129	3,134	2,782
South	16,481	16,702	15,806
Mississippi, Alabama, and Florida	2,501	2,594	2,633
New Mexico	9,421	9,374	8,015
Texas	121,071	119,989	113,294
East Texas	8,677	9,270	9,005
West Texas	53,233	53,027	53,264
Texas Gulf	25,229	24,860	21,992
Other Texas	33,932	32,832	29,033
Wyoming	13,936	13,971	16,378
Other Rocky Mountain	6,836	6,826	6,487
California	36,888	36,663	27,742
Foreign	†16,619	17,325	10,569
Total	277,065	‡276,597	256,278

*Bureau of Mines. †Includes 5,687,000 bbl. in California. ‡Revised.

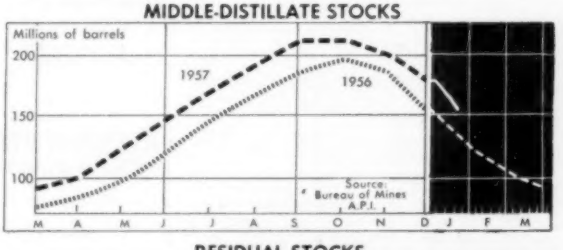
REFINERY RUNS



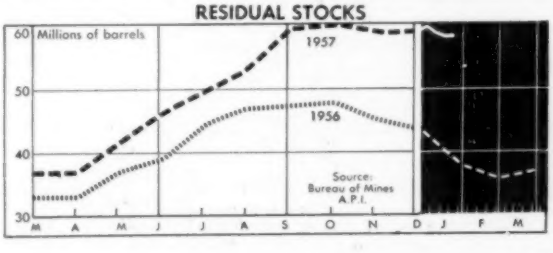
GASOLINE STOCKS



MIDDLE-DISTILLATE STOCKS



RESIDUAL STOCKS



API REFINERY REPORT—JANUARY 24, 1958

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1957 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,169	488.1	24.6	342.9	209.0	43,406	10,487	48,697	11,702	1,214	505.7	39.9	370.5	244.6
Appalachian:														
District 1	102	44.9	4.4	34.1	10.0	5,120	585	2,538	655	103	40.6	6.3	24.0	9.5
District 2	97	55.1	13.6	12.0	11.9	2,753	395	885	463	111	53.3	6.9	20.7	16.7
Ind., Ill., Ky.	1,330	698.8	71.3	305.6	172.8	35,382	5,276	16,974	5,168	1,463	740.7	70.4	345.0	220.4
Minn., Wis., Dak.	107	46.0	5.4	28.7	12.4	6,951	926	6,320	411	100	47.9	5.6	25.7	12.5
Okla., Kans., Mo.	729	421.6	15.4	197.2	38.3	19,319	927	9,699	1,299	714	395.7	16.6	184.8	41.5
Inland Texas	274	187.0	13.8	51.0	22.7	8,237	391	1,681	2,101	279	198.0	7.3	52.0	27.0
Texas Gulf Coast	1,782	861.4	117.7	491.4	202.3	28,712	2,182	14,710	5,573	2,033	914.6	135.1	595.8	257.6
La. Gulf Coast	598	333.3	61.3	108.2	32.0	12,919	1,595	6,316	1,270	704	346.5	62.1	218.6	61.1
N. La. and Ark.	121	42.9	10.3	19.7	8.9	4,966	623	1,988	142	101	41.1	9.4	24.7	8.9
Rocky Mountain														
New Mexico	30	14.7	1.0	7.1	3.6	389	18	144	90	28	13.9	0.3	5.3	3.6
Other Rocky Mt.	253	115.3	2.3	63.3	35.6	6,725	272	2,656	949	286	137.2	2.4	66.6	41.0
West Coast	1,047	469.3	1.3	130.7	301.1	28,377	374	15,573	27,987	1,138	504.0	4.9	184.4	377.9
Jan. 24, 1958	7,639	3,778.4	342.4	1,791.9	1,060.6	203,256	24,051	128,181	57,810	8,274	3,939.2	367.2	2,118.1	1,322.3
Jan. 17, 1958	7,675	3,817.7	387.4	1,961.9	1,018.9	200,636	25,343	135,406	57,952	.....	.....	.....	.....	.....
Jan. 25, 1957	8,189	3,835.7	355.3	2,047.6	1,243.1	193,248	25,619	106,490	39,531	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.25-11.75
Premium (98 octane)	14.00-14.50
Gulf Coast (cargoes for coastwise or export movements):	
★ Regular (90 octane)	10.25-10.75
★ Regular (92 octane)	10.50-11.00
★ Premium (97 octane)	12.00-12.50
★ Premium (98 octane)	12.25-12.75
California (rack) (Los Angeles):	
Regular (88 octane)	12.2
Premium (96 octane)	14.5
Premium (98 octane)	15.0
Caribbean area (cargoes):	
Regular (87 octane)	10.375
Premium (93 octane)	11.25

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
★ Kerosine 42-44	9.75-10.00
★ Diesel oil (58 d.i. and above)	9.375-9.75
★ Distillate No. 1	9.375-9.75
★ Distillate No. 2	8.75-9.00
Gulf Coast (cargoes):	
Kerosine 41-43	8.75-9.00
Distillate No. 2	8.50-8.75
New York Harbor (barges):	
Kerosine 41-43	10.55-10.75
Distillate No. 2	10.05-10.25
Diesel fuel, 48-52 d.i.	10.35-10.55
Caribbean area (cargoes):	
★ Distillate No. 2	8.75

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★ Residual fuel (max. 1% S)	$1.25-1.40
Gulf Coast (cargoes):	
★ Bunker C fuel	$2.35-2.50
New York Harbor (barges):	
★ Bunker C fuel	$2.75
Caribbean (cargoes):	
★ Bunker C	$2.35
California (rack):	
Bunker C fuel, Los Angeles	$2.65-2.80

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	27
200 vis. neutral (180° at 100°), 25 p.t.	25

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour) (§)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.81
16-16.9	2.74	....	....	....	1.86
17-17.9	2.78	....	....	....	1.91
18-18.9	2.82	....	....	....	1.96
19-19.9	2.85	....	....	....	2.01
20-20.9	2.89	$2.75	....	$2.62	2.06
21-21.9	2.93	2.77	....	2.64	2.11
22-22.9	2.97	2.79	....	2.66	2.16
23-23.9	3.01	2.81	$3.44	2.68	2.21
24-24.9	3.05	2.83	3.46	2.70	2.26
25-25.9	3.09	2.85	3.48	2.72	2.31
26-26.9	3.13	2.87	3.50	2.74	2.36
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour. §Most buyers are posting Wyoming sour in two schedules, 15°-26.9° and 27°-40°.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.65
Middle District	4.47
Southwest Pennsylvania	4.18
West Virginia	4.00
Buckeye Grade	4.00
Zanesville Grade	3.04
Illinois Basin	3.00-3.05
Canada:	
Leduc-Woodbend	2.74
Redwater (Alta.)	2.63
Smiley (Sask.)	2.40
Pembina	2.61

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.59
Iraq, 36.0°-36.9°, Tripoli, Banias	2.59
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC—7.5%)	$2.64
★ Carib.-U.S.N.H., dirty (USMC—60.0%)	1.08
★ Sidon-U.S.N.H., dirty (USMC—74.0%)	2.03
P.G.-France, dirty (USMC—80.0%)	2.18

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WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil Journal.

ONE 28L BUCYRUS-ERIE cable tool rig, dog house, light plant, forge and drilling tools. Phone L. E. Reames Jr., 480-M; L. E. Reames Drlg. Co., 92. Or write L. E. Reames Drlg. Co., Rt. #1 Fairmont Addition, Pawhuska, Oklahoma. Inventories furnished upon request.

COMPLETE Bulk Sand Fracturing Plant & Two Bulk Trucks, consisting of 450 ton storage, belt conveyor, bucket elevator, loading hopper, portable bazooka. Can be moved to any railroad siding. Will sell all or any part at a sacrifice. $15,000.000 FOB Charlotte, Texas. Call Glen H. Arthur—Mohawk 4-7782 or MO 4-4122, Alice, Texas.

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One Failing Portable Drilling Rig mounted on Hobbs Low-Boy Tandem Trailer with One C-100 6¼ x 10 Ideal Pump and 2500 ft. 3½ in. Drill Pipe. Rig Complete and ready to run. Ph. WElls 3-2128.

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Electric Generating Units

3—400 H.P. Ingersoll-Rand PVG Gas Engines, 400 R.P.M. direct connected to
3—250 KW Electric Machinery Co., A.C. Generators @ 400 R.P.M., 80% P.F., 3/60/480 Volts, Belt Driving, 7½ KW Exciters 1750 R.P.M., 125 Volts complete with switchboards. Used, Good Condition.
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1—5000 Bbl., Diameter 41'2", Height 32'11⅜", 20 p.s.i., suitable storage natural gasoline having RVP of 26 p.s.i. Erected new 1946 by Chicago Bridge & Iron. Excellent condition. Detail specifications available.
Located—Lance Creek, Wyoming

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Houdriflow Catalytic Cracker
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FURNACES - BLOWERS - REACTORS - KILN - TOWERS - FINES SEPARATORS - ELUTRIATORS - HEAT EXCHANGERS - REBOILERS - PUMPS - COMPRESSORS - RECEIVERS - BINS & HOPPERS, ETC.

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SEPARATOR—Hardinge Classifier Oil/Water
REBOILERS—750 to 993 Sq. Ft. 125 to 350 PSI
CONDENSERS—331 to 1500 Sq. Ft. Steel/Adm.
TUBES—NEW—Seamless 4-6% Chrome 4" to 6⅝", ⅝" to 1" Steel, Admir. 2 Alum.
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DRUMRIGHT, OKLA. (P. O. Box 587 Phone 569)
ALLEN, OKLA. (P. O. Box 344 Phone 90)

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ALLEN, OKLA.

REACTORS—6' x 42' 345 PSI @ 850° F.
REBOILER—318 Sq. Ft. 325 @ 350° F.
PRESSURE VESSELS—10 '× 15'—4' x 5'—3' x 7' 2' x 6'—18" x 22'—12" x 18'
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NEW FURNACE TUBES—Croloy 5—2⅛" to 4" OD
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FURNACES—Intermediate—Light—Skimming—Vac.
BOILERS—394 HP B & W Sterling
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STEAM PUMPS—Duplex 5¼ x 4¾ x 5 to 14 x 7¼ x 14
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14" x 40' Tower, 160#
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24" x 28' Tower, 550#

8' x 75', 20 Tray, 25#
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18" x 32', 15 Tray, 160#
12" x 27', 20 Tray, 450#
24" x 42', 22 Tray, 230# T-304SS
18" x 23', 11 Tray, 200# T-316SS
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Valves: Steel & SS ½" through 6"
Furnaces: Petro-Chem, ½, ¾ mil. BTU-HR.

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Steel Tube: 1000, 900, 650, 500, 300, 200 sq. ft.
Adm. Tube: 2250, 2200, 1300, 900, 740, 625, 300 sq. ft.
S.S. Tube: 1228, 947, 570, 536, 380, 315, 250, 137 sq. ft.
4-6% Chr. Tube: 1000, 500 sq. ft.
Fin Tube: 73, 21, 11 sq. ft.

PUMPS

Hot-Oil: 324 gpm @ 4600'; 735 gpm @ 3100'; 400 gpm @ 2000'; 1270 gpm @ 400'.
Water: 10,500 gpm @ 135'

COMPRESSORS

Worth.: LTC-6, Gas Engine, 800 hp.
Penna.: 100 CFM @ 500#; 385 CFM @ 160#

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SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

WELL DRILLS - CORE DRILLS. Everything for well and core drilling in both new and used equipment, at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

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1 36L BUCYRUS Spudder complete with 5 and 7 inch tailing in tools. Dog house, butane tank, junk rack and light plant. Rod and tubing tools and hand tools. Phone Office 144, Res. 614, Cleveland, Oklahoma.

SERVICE COMPANY EQUIPMENT—Wichtex C-60 and C-65 double drum mounted units, three pickup trucks, light plant and complete tools $25,000.00. May be inspected in operation. Novice, Texas, Phone 363, or Fort Worth, ED 6-3788.

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Complete with #50, #8044, #8046 Nozzles
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In Operation Two Weeks
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9—300 H.P. Ingersoll-Rand, Model 8-XVG Gas Engine Compressors, 350 R.P.M. w/Compressor Cylinders sizes 3¼" to 19½" x 12".

Used, Good Condition.

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E. M. GENERATOR	EXCITER
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VOLTS—480	VOLTS—125
AMPS—187	AMPS—32
RPM—514	RPM—514
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CASING COUPLINGS:—51 pcs. 13⅜" OD x 8 Rd. thd. x 8" long, for sale. Never in use. JULIUS M. FOGELMAN, Reading, Penna.

U-34 DRAWWORKS Serial #68 with WAK engine Serial #732489 and Torque Converter Serial #90642. Price $15,000.00. 127' Lee C. Moore Mast Serial #T-797 with 5½' x 34' substructure and 16" sub-base, extension braces, etc. Price $11,600.00. All located near Tulsa. Box K-524, The Oil and Gas Journal, Tulsa, Oklahoma.

COMPLETE PORTABLE ROTARY RIG: Mounted Tandem Trailer, 7 x 10 Wheatley Mud Hog; Includes 2 trucks, 2000 ft. capacity, located Roy, N. M. $10,000 for quick sale, see Lloyd Gambrel at Roy or write Stumpff & Owen—Room 710, Cooper Bldg., Denver, Colorado.

D-8 CATERPILLAR TRACTOR, Dozer and #70 Caterpillar Scraper. Bought new in 1951. Low hours. Like new condition. Located Matador, Texas. Rock Island Oil & Refining Co., Inc., 321 West Douglas Avenue, Wichita 2, Kansas.

PBY AMPHIBIAN AIRCRAFT—Surplus to Canadian Exploration Company's use. Extra Large Cargo Door and Cargo Floor. Executive Passenger Compartment, Emergency Rocket Power, Galley Facilities, Survey Turret in Nose. Aircraft Completely Outfitted for Instrument Conditions and 2 Crew Operation, Extremely Well Maintained and in Excellent Condition. Available for Immediate Sale at Reasonable Price. Box K-509, The Oil and Gas Journal, Tulsa, Oklahoma.

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FRANKS COMET 6000—No Junk—4½" drill pipe, 14" Pump—Complete inventory location, bottom dollar. Box K-506, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR 8" PIPE. Stationary pipe cleaning machine and power straightener. Redneb Pipe Co. P. O. Box 1798, Shreveport, La.

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ONE 8" AND ONE 12" Landis Pipe Machines. Used in good condition. Box K-516, The Oil and Gas Journal, Tulsa, Oklahoma.

COUPLINGS—6" used—A.P.I. Line Pipe Couplings. State Condition, Quantity, Price. Box K-523, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPE WANTED, USED: 5 miles used pipe wanted. 2½" to 4" dia. Tubing acceptable. Must be real bargain in A-1 condition. Box K-533, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

RADIOACTIVITY Logging Operators with perforating experience openings in Oklahoma and Kansas. Jetwell, Inc., 932 Mayo Building, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List oil companies, drilling contractors, seismograph contractors, showing where apply foreign jobs, $5.00 cash. OIML Co., Box 2603, Tulsa, Okla.

SALES ENGINEER by major tubular manufacturer for southwest. Field experience desired but not required. Salary dependent on background. Car and expenses and other substantial benefits. Forward resume and salary requirements. Replies held in confidence. Interviews arranged for qualified applicants. Our employees are aware of this ad. Box K-531, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER

Chemical Engineer, 34, 12 years experience in sales of process and mechanical equipment, engineering and construction sales, economic studies and contract negotiations purchase and sale of natural gas and products. Experienced in supervision of district sales office and agents for selling to all phases oil, gas and chemical industries in Southwest. Will relocate and travel. Desire connection with expanding company and opportunity for sales management. Western Canada of interest.

Box K-521,
The Oil and Gas Journal,
Tulsa, Oklahoma.

HELP WANTED

EXPANDING INDEPENDENT OIL COMPANY

Immediate opening for salesman of refined products who has considerable background and experience in refinery sales and a person with excellent past performance record. Prefer college graduate under 40. For full consideration send detailed resume of background and experience and salary requirements together with any information that may be of help in evaluating your application. Also prefer snapshot if available.

REPLY TO
Box K-518,
The Oil and Gas Journal,
Tulsa, Oklahoma.

ASSISTANT DEPARTMENT MANAGER

Company located in the Mississippi Valley has an immediate opening for an Assistant Manager in its Ammonia Department. Individual should possess a BSChE Degree and have 3 to 8 years supervisory production experience, coupled with potential for promotion to Department Manager.

State education, experience, and salary history and requirement in first letter to:

Box K-525,
The Oil and Gas Journal,
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PETROLEUM ENGINEERS
FOREIGN AND DOMESTIC

Several career positions open for graduate petroleum, chemical, electrical or mechanical engineers with oil producing operations experience.

PRODUCTION & RESERVOIR:
Petroleum production, development or reservoir engineering experience; to collect, analyze and evaluate data pertaining to the characteristics and performance of oil reservoirs; to study reservoirs in order to determine the most efficient production methods and secure optimum production. Also basic reservoir research concerned with evaluation of oil production reservoirs. Assignments in Saudi Arabia and New York.

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5 years in petroleum engineering work with 2 years in the drilling phase. To furnish engineering advice and assistance in the development of proven potential petroleum producing fields and improvement of the efficiency of drilling operations. Assignments in Saudi Arabia.

Excellent community facilities in Arabia. Salaries commensurate with background and experience plus all inclusive benefit plans.

Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 258

ARABIAN AMERICAN OIL COMPANY
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HELP WANTED

GEOLOGISTS under 35 with 2-10 years' experience including well sitting, subsurface, or exploration work in West Texas, Gulf Coast or Louisiana areas for openings in Dallas and Houston. Send detailed resume, snapshot, and salary requirements to Independent Oil Company, P. O. Box 2162, Dallas, Texas.

SITUATIONS WANTED

GRADUATE PETROLEUM ENGINEER: 30; 6 years experience, production and drilling. Two years foreign. Box K-512, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION, Water Treating Engineer: Chemical graduate. 15 years experience, operations and sales, Mid-Continent, Texas area. Presently employed. Will relocate. Box K-504, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE-LANDMAN — Major company 12 years. Desires part time work Texas Gulf Coast & Louisiana. Box K-519, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Foreign Observer—presently employed stateside desires contract immediately—pack or truck. Speak Indonesian and Spanish familiar with H.T.L. and Texas Inst.—Doodlebugged nine years—31 years old—married—one child. Box K-527, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: 16 years experience—reservoir, reserves, evaluation, economics, development, operations—administrative and staff. References and resume. Box K-526, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: young, married, ten years experience, principally Mississippi and South Louisiana; successful oil finder, administrator. Desire position with small company or substantial independent, location immaterial. Box K-532, The Oil and Gas Journal, Tulsa, Oklahoma.

15 YEARS experience in Oil Production. Some college, age 38. Will consider Latin American employment. Available any time. Box K-530, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE BROKER, 16 years broker and major company experience all phases land and drilling deals. Desires permanent opportunity with independent oil company in Rocky Mountain area. P. O. Box 2584, Salt Lake City, Utah.

RESEARCH GEOLOGIST - STRATIGRAPHER, 30, master's, extensive experience structural, lithofacies mapping. Box K-496, The Oil and Gas Journal, Tulsa, Oklahoma.

DENVER INDEPENDENT OIL Accountant, 28, BSBA. Experience in production, drilling and exploration. Desire supervisory position with aggressive Denver independent. Executive potential. Present employer reference. P. O. Box 2891, Dallas 21, Texas.

GEOLOGIST - GEOPHYSICIST, eighteen years experience, majority in geophysics, U. S. and Canada. Available immediately, managerial capacity or geophysical coordinator, prefer producing company, consider contractor, domestic or foreign. Richard H. Benish, 1273 Ash Street, Denver, Colorado.

EFFICIENT OPERATOR, 41, 14 years experience, Crude Unit, Vis Breaker, Vacuum, T.C.C., Alky., Gas Plant, Cat Poly & Catalytic Reforming. Desires operating position. Would consider start up work. Box K-513, The Oil and Gas ournal, Tulsa, Oklahoma.

LANDMAN—10 years experience all phases land work, West Texas, Gulf Coast, South Louisiana. Will relocate. Extensive knowledge of Louisiana. Title problems. Now employed by major. Box K-535, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 30, Master's, 5½ years major, 1 stratigraphic, 4½ subsurface in Texas, will relocate domestic, consider foreign. Box K-459, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST

Young (37), aggressive, explorationist seeks more responsible position with large or small independent. Broad background in subsurface and geophysical coordination. Experience in Texas, California, Wyoming, Kentucky, and Alaska. B.A., M.S. If your company needs someone to originate, direct, and/or pursue a sound program of oil exploration, I am your man.

Box K-534, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM ENGINEER: 6 years varied experience, workover and completion. Age 31. Box K-511, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL EXECUTIVE, Comptroller, Treasurer, Director, Production, Drilling, Organization, Promotion. Available soon. Box K-497, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

WE WANT producing royalties, producing oil & gas properties, also farmouts gas acreage. Ben H. Williams — Clarendon, Texas.

HAVE EXCELLENT market for producing royalty. Prefer a developed or partially developed field. R. E. Clement, Box 65, Norman, Oklahoma.

LEASES

FOR SALE BY OWNER—160 acre oil and gas lease, SW ¼ of Section 1039, Block 43, H&TC RR Company Survey, Lipscomb County, Texas, $10.00 per acre. Loicano and Lee, 702 Continental Life Bldg., Fort Worth 2, Texas.

REAL ESTATE

FOR SALE—1 acre interest, Lincoln County, Oklahoma. 5-10 yield monthly. Name price. Joseph Moliterno, 25-85 36th Street, Astoria 3, L. I., New York.

MAP WEIGHTS

JUST LIKE AN EXTRA PAIR OF HANDS. Kraftbilt 20-ounce cream-colored horsehide weights hug drawings or maps to the table while you work. Hand-sewn with heavy duty stitching, they're shot-filled and round in shape for ease of use and long life. Ask for Catalog 57-B, Ross Martin Co., P. O. Box 800-A, Tulsa, Okla.

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MISSING HEIRS

WILL PERSONS who are attempting to locate Hall heirs in Edwards, Mississippi, please communicate with Herbert S. Weil, attorney, 1133 Whitney Building, New Orleans, Louisiana.

BUSINESS OPPORTUNITIES

FINANCIAL CONTACTS. Underwriters, Brokers, Private Finders of Capital reached. No shopping. Confidential. FREE ENTERPRISE ASSOCIATES, 817—51st St., Brooklyn, N. Y.

REPUTABLE Eastern Drilling Contractor available for Turnkey Contracts in Ohio. Thoroughly experienced with production, valuation, drilling, leasing and completion procedures. Box K-529, The Oil and Gas Journal, Tulsa, Oklahoma.

SELL YOUR GAS—Turn waste into cash. We will furnish compressors, gathering system and know-how if you have marketable gas. Knight Mfg. Co., Box 3265, Tulsa, TEmple 8-3304.

HAVE OBTAINED another 80 acre lease with perfect geological structure and several drill locations staked by geophysical surveys made with magnetometer. Have some more working interest available for only $425 per ⅛. Plat & details. L. Snavely, Geologist, Box 315, Coweta, Okla.

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WAREHOUSING

Warehousing for manufacturers of Oil and Gas Specialty equipment. Well organized facilities, includes office and phone accommodations if so desired.

Write, wire or phone for further information.

PETROLEUM INDUSTRY WAREHOUSE COMPANY

PHONE MOhawk 4-3338

P. O. BOX 1158 PAMPA, TEXAS

PRODUCTION WANTED

WANTED: Oil properties, 100 to 5,000 barrels daily in Oklahoma and Kansas. Morris Sitrin, P. O. Box 1160, Tulsa, Okla.

DESPITE "tight money," principals will buy any size oil-gas production reasonably priced. Quick action. Box 231, Scarsdale, N. Y.

PRODUCTION WANTED: Our client desires to purchase lease producing 50 to 250 barrels of oil per day above 5000 feet in Kansas, Oklahoma, Texas, New Mexico, Colorado, Nebraska or Wyoming. Please forward price, description and details to Oil Property Management Company, Box 856, Casper, Wyoming.

PRODUCTION FOR SALE

3 WELLS, 300 ACRES, consistent average 35 bbls. daily, Richardson County, Nebr., half working int. $14,000. Box K-528, The Oil and Gas Journal, Tulsa, Oklahoma.

BARTLESVILLE PRODUCTION for sale. Leases covering 800 acres, 27 producing wells, daily average production 18 barrels. Montgomery County, Kansas. For details write Box K-498, The Oil and Gas Journal, Tulsa, Oklahoma.

MAP CABINETS

END MAP-FILING WORRIES FOREVER! Kraftbilt Rollfiles keep rolled maps safe from dust, dampness, pilferers. Used by all major and hundreds of smaller oil companies. Send for new Catalog 58-B, Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Okla.

LEASE AND DRILLING BLOCKS

OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2000 acres. Write quickly to: Jefferson G. Smith, 215 Littlefield Building, Austin 15, Texas.

825 ACRES southeast Kansas flood, 33 Bartlesville wells. Will make available the great new Thermo-pressure recovery method which increases and speeds up production. Stoddard, 1917 Stevens, Minneapolis.

INVESTIGATE FOR PROFITS Leases $5 acre. Royalties $30 up. Acreage near drilling active and advancing. References. E. M. Adams, Marshall, Texas.

NOTICE OF SALE OF OIL, GAS, AND SULPHUR LEASES

Pursuant to the provisions of Chapter 150 of the General and Special Laws of the State of Texas, passed by the 45th Legislature at its Regular Session, as amended by Senate Bill No. 248, passed by the 53rd Legislature at its Regular Session, the Board of Directors of the Agricultural and Mechanical College of Texas hereby offers for sale at public auction in the Office of the Comptroller, Room 202, System Administration Building, College Station, Texas, at 10:00 a. m. Thursday, February 20, 1958, the oil, gas, and sulphur leases on 1,147 acres in three tracts located near Maydelle in Cherokee County, Texas, as follows: the first tract being approximately 351 acres of land and being a part of the John Keenan Survey No. 500; the second tract being approximately 496 acres of land and being a part of the land granted to Calvin S. Hamilton, Assignee of James W. Spillers by Patent No. 171; the third tract being approximately 300 acres of land and being a part of the John A. Killian Survey, Abstract 402; all three tracts of land being under the exclusive control of the Board of Directors of the Agricultural and Mechanical College of Texas, and occupied by the Texas Forest Service. The right is reserved to reject any and all bids. For lease forms and particulars, address COMPTROLLER, Texas Agricultural and Mechanical College System, College Station, Texas.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 118.65 acres of land within the known geologic structure of the Carterville, Elm Grove and Rodessa Fields in Bossier and Caddo Parishes, Louisiana, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 P.M., EST, February 19, 1958, when bids will be opened. Details of the lease offering, description of the lands, how and where to submit bids and bid forms may be obtained from the Manager, Eastern States Land Office, Bureau of Land Management, Washington 25, D. C., H. K. Scholl, Manager.

EQUIPMENT MEN . . . in the news

Burgess-Manning Division Holds Sales Meeting . .

in Fort Worth, Tex. Attending were: (first row) R. J. Greenwell, Sample Brothers, Kansas City, Mo.; John R. Hesse, Bass Industrial Equipment Co., Buffalo, N. Y.; W. A. Carroll, Jr., and A. P. Gallagher, Burgess-Manning Co., Dallas, Tex.; Cliff Hawker, Bass Industrial Equipment Co., Ltd., Toronto, Canada; F. C. Duerr and L. G. Halla, Burgess-Manning Co., Libertyville, Ill.; Archie Schrieber, Diesel Service, Ames, Iowa; D. B. Hutchcraft, Hutchcraft Co., Tulsa; F. A. Harvey, manufacturers representative, Seattle, Wash.; Terry Lobdell, Bradbury-Kenrick Associates, Detroit, Mich.

Second row: W. C. Jack, Burgess-Manning, Dallas; R. T. Oliver, Burgess-Manning, New York; C. W. Myers, Burgess-Manning, Dallas; Ed Rhorda, Bradbury-Kenrick; D. D. Foster, D. D. Foster Co., Pittsburgh, Pa.; C. Fay Kenrick, Bradbury-Kenrick; H. L. Harris, Burgess-Manning, Dallas.

Third row: Art Johnson and Woods Martin, T. F. Hudgins & Associates, Houston; J. P. French, T. F. Hudgins, Odessa, Tex.; Ed Michaels, Guy T. Martin & Co., Gardena, Calif.; Stanley Zane, Paul A. Chapman & Associates, Chattanooga, Tenn.; R. A. Darling, R. A. Darling Co., Denver; G. R. Packer, Burgess-Manning, Dallas; J. A. Kolb, Burgess-Manning, New York.

Fourth row: Fred Ohlrich, Merchandising Advertisers, Inc., Chicago; W. R. Runbeck, Guy T. Martin, Gardena; E. S. Stoddard and H. A. Dietrich, Burgess-Manning, Libertyville; R. H. Campbell and S. G. Paddock, Burgess-Manning, Dallas; Howard Stegall, Bradbury-Kenrick, Detroit; and Sam S. Sample, Sample Brothers, St. Louis, Mo.

Staudt, Morris, Millard Named to NBT Board . .

JOHN STAUDT

at the annual stockholders meeting. John G. Staudt, executive vice president and director, Dowell Incorporated; William Morris, president, Sinclair Oil & Gas Co.; and Marvin Millard, senior vice president, National Bank of Tulsa, were named to the directorate. Morris replaces Henry L. Phillips who has recently retired from Sinclair.

Staudt joined Dowell in 1932 when it was formed by The Dow Chemical Co. Starting as a salesman, he transferred to Tulsa in 1934 as research engineer, was elected vice president in 1945 and later the same year was made executive vice president. He is a director of Dowell and is chairman of the executive committee, United Oilwell Service, S.A., Caracas, Venezuela, a subsidiary of Dowell.

WM. MORRIS

M. MILLARD

Morris joined Sinclair in 1933 and has served with Sinclair Refining Co., Sinclair Pipe Line Co. and Sinclair Oil Corp. He was elected vice president of the refining pipeline department in 1950. When Sinclair Pipe Line Co. was formed in 1951, he became vice president in charge of operations and

Cardwell Makes Charles Hamblin Ad Manager . .

for the Wichita, Kans., firm. According to Paul Courtney, general manager of Cardwell Manufacturing Co., Hamblin was formerly in the sales division of International Harvester Co.

C. C. HAMBLIN

Gulf Oiltool Co. Names Exclusive Agents . .

for foreign and domestic areas. International Tool & Supply Co., Inc., New York City, has been appointed exclusive agent for all countries other than Canada.

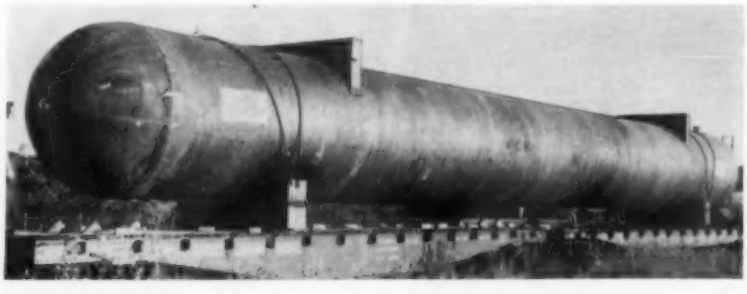
For the Gulf Oiltool casing scraper, agents include Texoma Oil Tool, Inc., Kilgore, Tex., for the East Texas area, and for West Texas and the Four Corners area, Harrie's Sales & Rentals, Inc., Odessa Tex.

Vice Presidents Named by Varel Manufacturing . .

at the annual meeting of directors. The new officers are Roscoe J. Blanton and Ralph A. Varel, according to Daniel W. Varel, president of Varel Manufacturing Co., Dallas, Tex.

Blanton, formerly plant superintendent, has been with the company since its start in 1947. His 17 years of machine-shop experience includes work with Engineering Laboratories, Inc., North American Aviation, and Medart Co.

Varel, formerly production manager, has been with the company since 1948, coming from Bundy Tubing Co., Detroit.



Master Tank & Welding Co. Ships 45,000-Gal. Tank . .

to Southern Minerals Corp in Corpus Christi. The tank, weighing 125,000 lb. and 110 ft. long with a 110-in. i.d., will be used for propane storage at the coastal refinery plant.

maintenance and its president in 1953. In 1957 Morris became vice president of Sinclair Oil Corp., New York, and in June of the same year was elected president of Sinclair Oil & Gas Co. in Tulsa.

Millard came to NBT in 1927. He has successively served as assistant cashier, assistant vice president and vice president. He was made a senior vice president in 1956.

Dowell Promotes Noble, Transfers Other Personnel

CHARLES NOBLE

Charles Noble has been promoted to district engineer in the Rocky Mountain area, according to Earl J. Davis, district manager at Denver.

Other promotions and transfers in the Rocky Mountain area are: Don Torgerson moves to Williston, N. D., from San Angelo, Tex., as station manager. M. E. Heslep, sales engineer at Williston, will now devote all his attention to sales in the Williston area. R. L. Dickson, who has been representing Dowell Incorporated's general office sales department in Billings, Mont., has been transferred to the Rocky Mountain district as a sales engineer. Ira Mumm, who has been at Vernal, Utah, for several years, will be station manager as well as supervisor of sales. L. V. Volkel, service engineer at Vernal, has been promoted to petroleum engineer. K. D. Henry has been transferred to Vernal as service engineer.

M. J. Carney, formerly service engineer at Henderson, Ky., has been transferred to Casper, Wyo. R. L. Mettle, formerly service manager at Kimball, Neb., has been promoted to station manager and will continue to headquarter at that point. Also in the Denver basin, O. W. Mason, service engineer, has transferred to Sterling, Colo., from Worland, Wyo. J. A. McClure, who has been located in the Williston basin for the past 6 years has been transferred to Charleston, W. Va.

Noble served with the seismograph department of Continental Oil Co. before joining Dowell as a junior engineer in 1951. Following his promotion to a service engineer in 1952, he served at Hays and Eureka, Kans. He was promoted to development engineer and transferred to general headquarters in Tulsa in 1955. While in Tulsa, he worked as production engineer.

ADVERTISERS in this issue

A

ACF Industries, Incorporated, Valve Division ... 136
American Chain & Cable
American Cable Division ... 8
R-P & C Valve Division ... 9
American Iron & Machine Works Co. 132
Ampco Metal, Inc. ... 129
Anderson Company, The V. D. ... 124

B

Baker Oil Tools, Inc. ... 44
Bethlehem Steel Co. ... 114
Black, Sivalls & Bryson, Inc. ... 27
Bovaird Supply Co., The ... 1
Bower Roller Bearing Company ... 33
Butler Manufacturing Company ... 12

C

Cable Engineering ... 152
Caterpillar Tractor Co. ... 65
Classified Advertising ... 173, 174, 175
Coates Field Service, Inc. ... 117
Coffing Hoist Division, Duff-Norton Company ... 154
Continental Electric Motors ... 139
Coppus Engineering Corp. ... 5
Corrosion Services Incorporated ... 155
Crane Co. ... 91
Crose Manufacturing Co., Inc., M. J. 128

D

Detroit Diesel Engine Division, General Motors Corp. ... 26
Dowell Incorporated 112, Inside Back Cover
Drilling & Service, Inc. ... 163

E

Erico Products, Inc. ... 121
Evans, Inc., Dick ... 131

F

Fairbanks, Morse & Co. ... 4
Fleet-Line Co. ... 117
Fluor Corporation, Ltd., The ... 61
Ford Motor Company ... 46, 47, 108
Foxboro Company, The ... 28, 29

G

Gates Rubber Co., The ... 110
Goodrich Chemical Company, B. F. 7
Goodyear Tire & Rubber Company, The ... 13
Granberg Corporation ... 10, 11
Grancell, I. H. ... 115
Guiberson Corporation ... 148
Gustin-Bacon Manufacturing Co. ... 39

H

Halliburton Oil Well Cementing Co. ... Inside Front Cover, 14, 15, 153
Harrisburg Steel Co. ... 152
Holcombe Company, Inc., The ... 20
Huey & Co., S. E. ... 117
Hughes Tool Co. ... Back Cover
Hyatt Bearings Division, General Motors Corp. ... 140
Hycalog, Inc. ... 40

I

International Harvester Co. ... 18, 19, 31, 94, 95

J

Johnson Motors ... 16
Jones & Laughlin Supply Division ... 21, 22, 23, 24

K

Kellogg Co., The M. W. ... 25
Koenig Iron Works, Inc. ... 116

L

L-O-F Glass Fibers Company ... 123
Lone Star Cement Corporation ... 48
Lunkenheimer Co., The ... 69

M

Magnet Cove Barium Corp ... 107
Master Tank & Welding ... 120
McDonald Company, B. F. ... 116
McDonough Marine Service ... 115
Mission Mfg. Company ... 41
Moorlane Company ... 118
Morgan Stanley & Co. ... 151

N

National Supply Co., The 159, 160, 161, 162
National Tank Company ... 178

O

Oil Center Tool Co. ... 32
Onan & Sons, Inc., D. W. ... 120

P

Personalized Lighter Service ... 116

R

Raybestos-Manhattan, Inc., Packing Div. ... 36
Reading & Bates Offshore Drilling Co. 149
Refinery Supply Co., The ... 133
Roebling's Sons Company, John A. 147
R-P&C Valve Division American Chain & Cable ... 9

S

Sachse Electric Inc. ... 117
Schlumberger Well Surveying Corp. ... 37
Sikorsky Aircraft ... 42
Sinclair Oil Corporation ... 103
Smithco Engineering, Inc. ... 34

T

Tennessee Corporation ... 135
Timken Roller Bearing Company ... 30
Transcontinental Gas Pipe Line Corporation ... 127
Tulsa Paper Company ... 152

U

Union Asbestos & Rubber Company ... 119
Union Carbide Corporation, Union Carbide Chemicals Company ... 17
United States Steel Corporation—Witte Engine Works Oil Well Supply Division ... 6

V

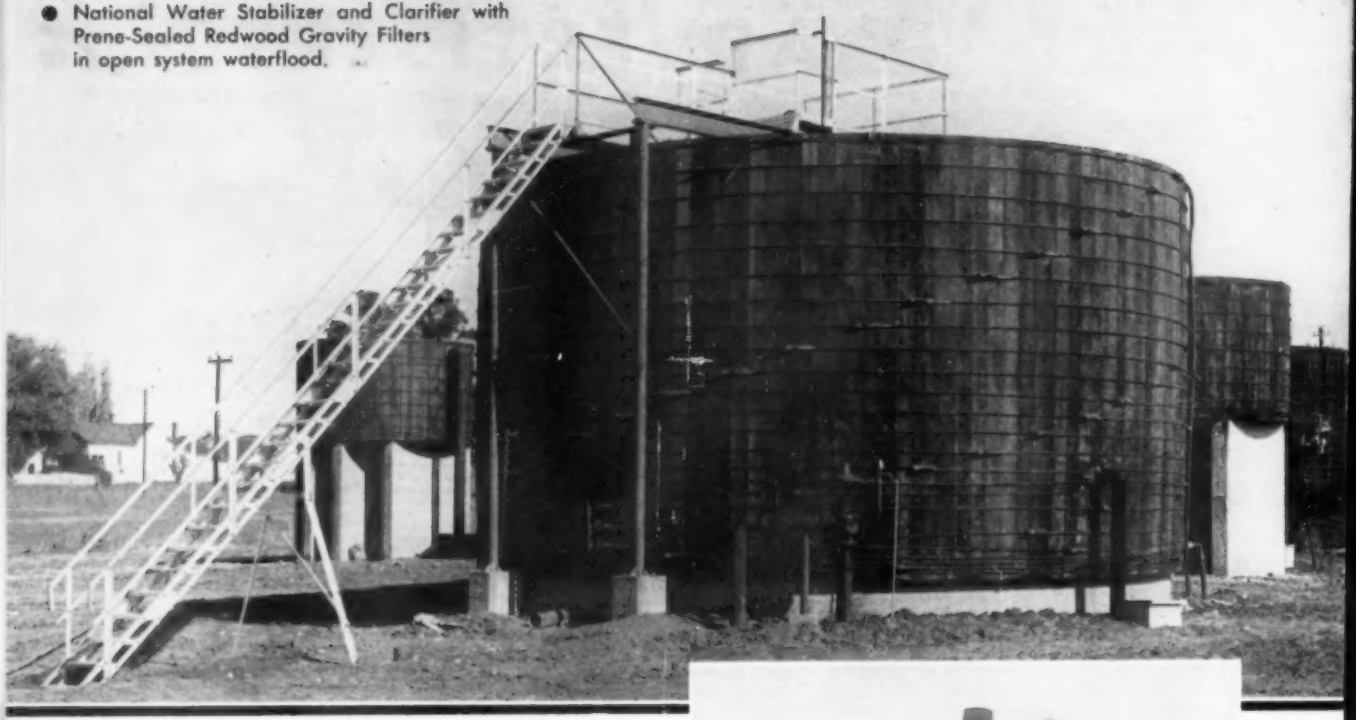
Valley Manufacturing Company ... 139
Vermeer Manufacturing Co. ... 149
Viking Pump Co. ... 122

W

Waukesha Sales & Service, Inc. ... 35
Weatherford Oil Tool Co., Inc. ... 38
Well Equipment Mfg. Corp. ... 156
Wisconsin Motor Corporation ... 134
Witte Engine Works Oil Well Supply Division, United States Steel Corporation ... 6
W-K-M Manufacturing Company, Inc., A Subsidiary of ACF Industries Incorporated ... 136
Wolverine Tube Division of Calumet & Hecla, Inc. ... 125, 126

Y

Youngstown Sheet and Tube Company 75



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National

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National's Raw Water Stabilizer and Clarifier is designed for rapid and thorough chemical treatment of disposal or flood water, through circulation of slurry followed by short relatively motionless periods to permit settling of precipitants. Sludge is drawn off automatically through a valve at the bottom of the tank. The result is a stabilized clear water being delivered to the filters. Volume of water to be treated determines the size of the Stabilizer and Clarifier since a particle of water remains approximately two hours in the tank. The Unit is available in Bolted Steel Tanks, Prene-Sealed® Redwood and Rezo-Glas® Plastic Tanks. Internals are available of hot dipped galvanized after fabrication or Rezo-Glas non-corrosive plastic material, or steel with special coatings.

These units are available in a wide range of capacities and sizes from over 50 Warehouses in the United States, Canada and Venezuela.

Write for Tank Topics - "Water Treating, Flood and Disposal"

24′ x 16′ National Water Stabilizer and Clarifier with chemical building.

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NATIONAL TANK COMPANY

TULSA, OKLAHOMA

Dowell Guide to Acidizing . . .

1 DEVONIAN
Lea County, New Mexico

Vugular formation usually below 12,000 feet. Common treatment is 500 gals. Mud Acid, followed by 3000 gals. acid with Dowell wetting and emulsion control agents. Results: wells often potential from 1500 to 1800 bopd.

2 MADISON
Williams County, North Dakota

Highly fractured vugular limestone of low porosity. Permeability seldom over two millidarcys. 90 to 92 per cent soluble. Usual treatment: Acid Petrofrac® — 250 gals. fluid per foot. Results: wells often test 200 to 1000 bopd.

3 D-1
Lac St. Anne Area, Alberta, Canada

Tight dolomitic formation. Responds well to Mud Acid wash, followed by 2000 to 4000 gals. Dowell acid with agents to control silicate swelling and emulsion. Results vary but generally considered profitable by the operator.

4 ELLENBURGER
Andrews County, Texas

Usually below 13,000 feet. Often needs only 500 to 1000 gals. Mud Acid. Where further stimulation is needed, 5000 to 20,000 gals. Dowell X Acid with silicate control and anti-emulsifying agents is used to good effect.

5 McCLOSKY
Clay County, Illinois

Oolitic limestone formation, 12 to 30 feet thick at about 3000 feet. Responds well to 5000 gals. Dowell acid containing surface tension reducing agent and a non-emulsifying agent. Results: wells often produce 240 bopd after acidizing.

6 RODESSA
Cass County, East Texas

Oolitic limestone at about 6000 feet. Usual treatment: 1000 gals. Dowell acid with wetting agent. Then 2000 gals. Channeling Acid and 10,000 gals. Dowell acid with wetting agent. Results: wells often test over 700 bopd.

These are just six examples of Dowell acid treatments that are being used successfully under widely varying conditions. Whatever *your* well conditions, call Dowell for dependable, profitable stimulation treatments. Dowell Incorporated, Tulsa 1, Oklahoma.

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Pioneered and perfected by Hughes — Tri-Cone rock bits set the standard of performance the world over. Back of each Tri-Cone bit is the industry's greatest rock bit experience . . . plus a half century of laboratory and field research. Wherever you drill, Hughes bits — either regular or Jet — are available in the sizes and types best suited to your particular drilling requirements. And of this you can be sure — the bits you get will incorporate the very latest in rock bit improvements!

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HUGHES OWV – THE VERSATILE BIT – DRILLS EITHER MEDIUM SOFT OR MEDIUM HARD FORMATIONS